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Plants Collected by the Vernay Nyasaland Expedition of 1946 (continued)
J. P. M. Brenan and Collaborators 1

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PLANTS COLLECTED BY THE VERNAY NYASALAND EXPEDITION OF 1946

(Continued from Volume 8, Page 506)

J. P. M. BRENAN AND COLLABORATORS

LOGANIACEAE (*Continued*)

Anthocleista zambesiaca Bak. Kew Bull. **1895**: 99. 1895; in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 540. 1903.

Kota-kota District: Nchisi, fragrant and very conspicuous in forests of gullies, tree to 20 m. high and 40 cm. in diameter, leaves to 60 cm. long, more or less fleshy, clustered at ends of branches, buds only, panicles produced in axils of 1–3 terminal pairs of leaves, fruits green, native name (Chinyanja) nguonguo, 1350 m., Aug. 1, 1946, *17072*. Cholo District: Cholo Mountain, common in relic rain-forest of gullies, tree about 20 m. high and to 50 cm. in diameter, buds only, 1200 m., Sept. 28, 1946, *17854*. Portuguese East Africa, Nyasaland, N. and S. Rhodesia, the Transvaal, and Swaziland.

Strychnos pungens Solered. in Engl. & Prantl, Nat. Pflanzenf. **4**^{2}: 40. 1892; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 530. 1903.

Kasungu District: Kasungu, common in *Brachystegia* woodlands, tree 4–6 m. high, fruit 8–9 cm. in diameter, globose, blue-green, solitary on short lateral branchlets, eaten by natives, native name (Chinyanja) mgaigaii, 1000 m., Aug. 26, 1946, *17432*. East Africa from Tanganyika Territory to the Transvaal and westward into Angola.

Strychnos innocua Del. Cent. Pl. Méroé 53. 1826; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 532. 1903; Bullock & Bruce, Kew Bull. **1938**: 45–52. 1938.

Mlanje District: Likubula Gorge, in *Brachystegia* woodlands, tree 7 m. high, leaves convex, dried fruits separate, fruits bluish-green, hard, globose, 4.5–7 cm. in diameter, edible, 840 m., June 20, 1946, *16373*. Kasungu District: Kasungu, one specimen in village, tree 10 m. high, fruit 3.5–4.5 cm. long, 4–5 cm. in diameter, lenticellate, subglobose, slightly compressed laterally, bluish-green, 1000 m., Aug. 27, 1946, *17434*. Widespread in tropical Africa.

Brass 17434 is an unusually broad-leaved form of this exceedingly variable species.

Strychnos cocculoides Bak. Kew Bull. **1895**: 98. 1895; Duvign. Lejeunia **13**: 114. 1949.

Strychnos schumanniana Gilg in Warb. Baum Kunene-Samb. Exp. 330. 1903; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 624. 1904.

Kasungu District: Kasungu, occasional in *Brachystegia* woodland, tree 3–5 m. high, branchlets thorny, fruits 6–7.5 cm. in diameter, globose, dark green mottled with pale green, eaten by natives, native name (Chinyanja) mgaigaii, 1000 m., Aug. 26, 1946, *17433*. Tanganyika Territory (?), N. and S. Rhodesia, and Angola; now new to Nyasaland.

I am prepared to follow Duvigneaud (l.c.) in considering *S. schumanniana* Gilg and *S. suberifera* Gilg & Busse as synonyms of *S. cocculoides* Bak.

Strychnos cf. **lokua** A. Rich. Tent. Fl. Abyss. **2**: 53. 1851; Duvign. Lejeunia **13**: 112. 1949.

Kasungu District: Kasungu, sporadic in *Brachystegia* woodlands, tree to 10 m. high, branchlets armed with hooked thorns, deeply ringed at nodes, leaves smooth and shining above, dull beneath, fruits 8–10.5 cm. in diameter, globose, yellowish-green, edible, native name mateme, 1000 m., Aug. 27, 1946, *17445*.

S. lokua extends from the Senegal and the Anglo-Egyptian Sudan to South Africa. It has been much misidentified with *S. spinosa* Lam.; for the differences see Duvigneaud (l.c.).

GENTIANACEAE

Exacum zombense ("zombensis") N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4**[1]: 546. 1903.

Zomba District: Zomba Plateau, several examples gregarious on a moist grassy bank, herb 8–15 cm. high, flowers pale blue, 1500 m., June 5, 1946, *16249*. Apparently endemic to Zomba.

Sebaea microphylla (Edgew.) Knobl. Bot. Centralbl. **60**: 324. 1894; Schinz, Mitt. Geogr. Ges. Lübeck **17**: 23. 1903.

Cicendia microphylla Edgew. Trans. Linn. Soc. **20**: 83. 1846.
Sebaea welwitschii Schinz, Viert. Naturf. Ges. Zürich **37**: 321. 1891; Bak. & Br. in Thiselton-Dyer, Fl. Trop. Afr. **4**[1]: 550. 1903.

Zomba District: Zomba Plateau, two examples on a sunny seepage slope, herb 20 cm. high, flowers yellow, 1450 m., June 5, 1946, *16239*.* S. Rhodesia, Angola, and now new to Nyasaland; also, oddly but seemingly genuinely, in India and China.

Sebaea leiostyla Gilg, Bot. Jahrb. **26**: 97. 1898; Bak. & Br. in Thiselton-Dyer, Fl. Trop. Afr. **4**[1]: 568. 1903; Schinz, Mitt. Geogr. Ges. Lübeck **17**: 32. 1903.

Zomba District: Zomba Plateau, several examples on a moist shady bank, herb 20–60 cm. high, flowers yellow, 1650 m., June 5, 1946, *16252*; ibid., one plant on a shady roadside, herb, flowers yellow, 1500 m., June 7, 1946, *16298*.* Kenya and Tanganyika Territory, southward to South Africa.

Sebaea grandiflora Schinz, Mitt. Geogr. Ges. Lübeck **17**: 45. 1903; Hill & Prain in Thiselton-Dyer, Fl. Cap. **4**[1]: 1084. 1909.

Sebaea crassifolia sensu Bak. & Br. in Thiselton-Dyer, Fl. Trop. Afr. **4**[1]: 547. 1904; non *S. crassifolia* Cham. & Schlecht.

Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent on paths in grasslands, herb 10–40 cm. high, flowers yellow, not seen in anthesis, 1860 m., June 26, 1946, *16434*; ibid., scattered on grassland paths and seepage slopes, herb, flowers yellow, 2140 m., June 27, 1946, *16462*. North Nyasa District: Nyika Plateau, common in open grasslands, herb 30–50 cm. high, flowers yellow, 2300 m., Aug. 14, 1946, *17226*. Portuguese East Africa, Nyasaland, S. Rhodesia, and the Transvaal.

The late Sir Arthur Hill pointed out a good many years ago (Kew Bull. **1908**: 330. 1908) that what was called *Sebaea crassifolia* in the *Flora of Tropical Africa* was quite distinct from the true South African species of that name; but in spite of this warning the name has remained undisturbed in the tropics. Of the correctness of Sir Arthur's view there is no question. The tropical plant finds its obvious place in *S. grandiflora*, previously assumed to be endemic to the Transvaal. At first I was prepared to separate the tropical material on account of the well-developed paired stylar swelling shown by, e.g. *Brass 16462*; but further examination showed that other gatherings, e.g. *Brass 17226* and *Adamson 452* (in Herb. Kew.), had the swelling very small or almost absent, but were otherwise quite inseparable. Gatherings both with and without the swelling have been made on Mount Mlanje. I therefore believe that this character is more variable than has been assumed in this species—a state of things similar to that in *S. leiostyla* Gilg.

S. erecta A. W. Hill, Kew Bull. **1908**: 328 (1908), was said to differ from *S. grandiflora* by the well-developed stylar swellings, and by the narrower leaves. The style difference now seems knocked out, but the slight leaf difference remains, and the status of *S. erecta* must depend on further collecting in the Transvaal.

Chironia laxiflora Bak. Kew Bull. **1894**: 25. 1894; Bak. & Br. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 556. 1903.

North Nyasa District: Nchena-chena, frequent in *Brachystegia* woodlands, herb 30–150 cm. high, flowers rose-pink, conspicuous, 1340 m., Aug. 21, 1946, *17376*. Tanganyika Territory, Nyasaland, and N. Rhodesia.

This specimen, together with some others from Nyasaland, has larger flowers and anthers than the type and specimens from southwestern Tanganyika Territory. There may here be a case for making two varieties, one with larger flowers, and very likely including *C. gratissima* S. Moore, Jour. Linn. Soc. Bot. 40: 148 (1911), the other smaller-flowered and including the type of *C. laxiflora*. For the present I think it best to follow the wide concept of Baker and Brown (l.c.), but I hope that botanists in Nyasaland will observe the variation in flower-size of this very attractive plant.

Swertia johnsoni N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 522. 1903; T. C. E. Fries, Notizbl. Bot. Gart. Berl. **8**: 509–511. 1923.

North Nyasa District: Nyika Plateau, locally common in open grasslands, perennial herb 30–40 cm. high, stems dark purple, leaves more or less fleshy, flowers purple, showy, glands on petals yellow, 2300 m., Aug. 13, 1946, *17194*. Southwestern Tanganyika Territory and Nyasaland.

Swertia cf. **curtioides** Gilg. Bot. Jahrb. 30: 379. 1901; Bak. & Br. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 580. 1904.

Mlanje District: Mlanje Mountain; Luchenya Plateau, open grasslands, herb, flowers white, 1860 m., June 26, 1946, *16435**; ibid., on seepage slopes in grassland, not common, herb 10–15 cm. high, flowers white, 2000 m., June 27, 1946, *16487*.* North Nyasa District: Nyika Plateau, locally abundant in grass in *Philippia* woodland, perennial herb 10–30 cm. high, corolla white, glands greenish-yellow, anthers black, 2300 m., Aug. 14, 1946, *17223*.

Brass 16435 and *16487* are dubious, as the plants are incomplete and abnormally grown, but a plant closely resembling *17223* has been collected on Mlanje Mountain: *Adamson 344* in Herb. Kew.

Brass 17223 is very like *S. curtioides*, previously only recorded from southwestern Tanganyika Territory, except that it is considerably more robust, owing, I suspect, only to outside conditions; but we want to know more about this. Another thing that must be borne in mind is that *S. curtioides*, together with several other of these annual Swertias, is a shaky species, and I believe that drastic reductions will be made in the future.

Swertia sharpei N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 581. 1904.

Zomba District: Zomba Plateau, locally plentiful on sunny seepage slopes, herb 10–40 cm. high, corolla purplish-white with purple veins, 1450 m., June 5, 1946, *16250*. Portuguese East Africa, Nyasaland, and S. Rhodesia; doubtfully in Uganda, Kenya, and Tanganyika Territory.

BORAGINACEAE

Ehretia amoena Klotzsch in Peters, Reise Mossamb. Bot. 248. *pl. 41.* 1861; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 24. 1905.

Ehretia stuhlmannii Gürke in Engl. Pflanzenw. Ost-Afr. **C**: 336. 1895; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 27. 1905.

Chikwawa District: Chikwawa, occasional in *Acacia albida* woodland, tree or shrub 4–5 m. high, almost past flowering, flower white, fruit immature, 200 m., Oct. 3, 1946, *17921*. Coastal belt of Kenya and Tanganyika Territory, southwards to Portuguese East Africa and Barberton in the Transvaal; this is the first record for Nyasaland.

There has been much confusion about this species in the past, chiefly owing to needless confusion with *E. caerulea* Gürke, and Baker and Wright's placing of *E. amoena* and *E. stuhlmannii* in different sections of their inadequate key in the *Flora of tropical Africa*.

E. stuhlmannii differs from *E. amoena*, of which there is an authentic specimen at Kew, merely in the larger broader leaves, and, besides the existence of all intermediates, I cannot see that this is enough to separate species, at any rate here.

Baker and Wright (l.c.) sank *E. mossambicensis* Klotzsch under *E. amoena*. I doubt this, and suspect rather that *E. mossambicensis* is an earlier name for *E. caerulea*; but am bound to admit that Klotzsch describes the calyx of *E. mossambicensis* as "zweimal kürzer als die Blütenkrone"—a character that fits *E. amoena*, but not *E. caerulea*, unless, as the accompanying plate rather suggests, the floral measurements of *E. mossambicensis* were taken from buds. In any case, unless an authentic specimen of *E. mossambicensis* is forthcoming, I suggest that the latter name be taken as a nomen dubium, and the unambiguous *E. caerulea* Gürke retained.

The most obvious features separating *E. amoena* and *E. caerulea* are as follows.

E. amoena: inflorescence densely pubescent but eglandular; corolla-tube equalling or up to 1⅓ times as long as the calyx.

E. caerulea: inflorescence densely glandular-pubescent; corolla-tube 2–3 times as long as the calyx.

I have not seen the type (*Dehn 697*) of *Ehretia caerulea* Gürke var. *glandulosa* Süsseng. Trans. Rhod. Sci. Ass. **43**: 42 (1951), said to differ from *E. caerulea* in having glandular inflorescence-branches and calyces. But, as Gürke in his original description of *E. caerulea* mentions glands on the calyx, and an isotype at Kew (*Goetze 484*) shows plenty of glands on the inflorescence and calyces, it looks as though Süssenguth has separated typical *E. caerulea* from itself.

Ehretia cymosa Thonn. in Schum. & Thonn. Beskr. Guin. Pl. 129 (1827) var. **divaricata** (Bak.) Brenan, **comb. nov.**

Ehretia divaricata Bak. Kew Bull. **1894**: 28. 1894; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 26. 1905.

Cholo District: Cholo Mountain, frequent in rain-forest canopy layer, tree 25 m. tall and to 0.5 m. in diameter, flowers white, produced in great abundance, 1400 m., Sept. 26, 1946, *17816*. For distribution see below.

E. cymosa Thonn. is antedated by *E. cymosa* Willd. ex Roem. & Schult. Syst. Veg. **4**: 805 (1819). Although this latter name is accompanied by a brief diagnosis, my colleague Mr. H. K. Airy-Shaw has kindly given me his opinion that *E.*

cymosa Willd. was published merely as a synonym, though a doubtful one, and that Roemer and Schultes did not intend to accept *E. cymosa* Willd. as a species, probably copying the diagnosis from the Willdenowian herbarium. *E. cymosa* Thonn. thus may be maintained.

E. cymosa Thonn. is a member of a plexus extending over much of tropical Africa, whose members were treated as species in the *Flora of tropical Africa* by Baker and Wright in their rather mechanical way. I can see no real specific differences between them, and believe that the following rearrangement will be more reasonable. Between the five varieties recognised there is nothing beyond the presence or absence of long hairs on the panicle, which is certainly of minor taxonomic importance here, and minor differences in size of calyx and flowers, which, while certainly correlated with geography, in my opinion represent only races of a single widespread and rather variable species.

Ehretia cymosa Thonn. var. **cymosa.**

Ehretia cymosa Thonn. sensu stricto.

Rami inflorescentiarum brevissime pubescentes vel puberuli. Flores saepius omnes vel fere omnes distincte pedicellati. Calyx 1–1.5 mm. longus. Lobi corollae 1.5–2.5 mm. longi.

Sierra Leone, Ivory Coast, Gold Coast, Togo, Nigeria, British Cameroons, Gaboon, Belgian Congo, and Uganda. The most important features of this variety are the short indumentum on the inflorescence coupled with the short calyx.

Ehretia cymosa Thonn. var. **zenkeri** (Gürke ex Bak. & Wright) Brenan, comb. nov.

Ehretia zenkeri Gürke ex Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. 4^2: 25. 1905.

Rami inflorescentiarum pilis patentibus longioribus dense vestiti. Flores ut in var. *cymosa.*

Gold Coast, Nigeria, French Cameroons. Closely similar to var. *cymosa* except for the long indumentum on the inflorescence.

Ehretia cymosa Thonn. var. **divaricata** (Bak.) Brenan, comb. nov.

Ehretia divaricata Bak. Kew Bull. **1894**: 28. 1894.

Rami inflorescentiarum brevissime pubescentes vel puberuli. Flores saepius infimis exceptis sessiles vel subsessiles. Calyx 2–2.5 mm. longus. Corolla circiter 4.5–5.5 mm. longa; tubus 2 mm. longus; lobi 2.5–3.5 mm. longi.

Belgian Congo, Uganda, Kenya, Tanganyika Territory, Nyasaland, and S. Rhodesia. In its indumentum var. *divaricata* resembles var. *cymosa*, but it differs in the larger calyx and corolla.

Ehretia cymosa Thonn. var. **abyssinica** (R. Br. ex Fres.) Brenan, comb. nov.

Ehretia abyssinica R. Br. in Salt, Abyss. Append. lxiv. 1814, nomen nudum; ex Fres. Flora **21**: 608. 1838; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. 4^2: 23. 1905.

Rami inflorescentiarum et calyx ut in var. *divaricata* vel rami pilis longioribus sparsis vestiti. Corolla 6–7 mm. longa; tubus 3 mm. longus; lobi 3–4 mm. longi.

Abyssinia and Eritrea. This variety is very closely similar to var. *divaricata* except for its larger corolla.

Ehretia cymosa Thonn. var. **silvatica** (Gürke) Brenan, comb. nov.

Ehretia silvatica Gürke, Bot. Jahrb. **19**(Beibl. 47): 46. 1895; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. 4^2: 23. 1905.

Rami inflorescentiarum pilis patentibus longis vel longiusculis ± dense vestiti. Calyx 2–3 mm. longus. Lobi corollae 2–3 mm. longi.

Abyssinia, Uganda, Kenya, and Tanganyika Territory. Var. *silvatica* is closely similar in calyx and corolla to var. *divaricata*, differing in the long indumentum of the inflorescence.

The five varieties of *Ehretia cymosa* recognised here may be summed up as follows. The calyx and corolla may be small, coupled with puberulous or shortly pubescent (var. *cymosa*) or with long-pubescent or long-pilose (var. *zenkeri*) panicle-branches; or the calyx and corolla may be large, again coupled with puberulous or shortly pubescent (var. *divaricata*) or with long-pubescent or long-pilose (var. *silvatica*) panicle-branches; var. *abyssinica* is near var. *divaricata* but with even larger corollas. The small-flowered varieties are predominantly west African, the var. *cymosa* extending to Uganda, while the large-flowered varieties inhabit eastern Africa.

There may be a densely pilose variant of var. *abyssinica*, bearing to it the same relationship that var. *silvatica* does to var. *divaricata*, but the evidence is at present not sufficient. Intermediates between all the varieties may be found.

Heliotropium indicum L. Sp. Pl. 130. 1753; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 32. 1905.

Chikwawa District: Lower Mwanza River, on sandy riverbanks, herb 50–70 cm. high, stem simple, flowers white, 200 m., Oct. 3, 1946, *17929*. Tropics of Old and New Worlds.

Heliotropium ovalifolium Forsk. Fl. Aegypt.-Arab. 38. 1775; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 34. 1905.

Chikwawa District: Lower Mwanza River, on sandy beaches of river, herb 50 cm. high, grey-green, with ascending branches, corolla-lobes white, tube yellow, 180 m., Oct. 4, 1946, *17973*. Widespread in tropical Africa; also in Egypt, Arabia, and India.

Trichodesma physaloides (Fenzl) A.DC. in DC. Prodr. **10**: 173. 1846; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 46. 1905; Brand, Pflanzenreich **78**(4^{252}): 22. 1921.

Friedrichsthalia physaloides Fenzl in Endl. & Fenzl, Nov. Stirp. **7**: 54. 1839.

Dedza District: Dedza, frequent in *Brachystegia* woodland, perennial herb 40–50 cm. high, young shoots flowering after burning of the grass, rootstock thick, fleshy, stems several, erect, flowers white, nodding, 1500 m., Sept. 13, 1946, *17624*. Anglo-Egyptian Sudan, southwards to the Transvaal.

Trichodesma hockii De Wild. Repert. Sp. Nov. **11**: 546. 1913; Brand, Pflanzenreich **78**(4^{252}): 26. 1921.

Kota-kota District: Kota-kota, flowers purple or pink, Aug. 1946, *Vernay 17399*. Belgian Congo, Tanganyika Territory, Portuguese East Africa, Nyasaland, N. and S. Rhodesia.

Much of the material named *T. physaloides* from south tropical Africa seems better placed under *T. hockii* on account of the greater hairiness, broad sepals, more condensed inflorescence, larger spreading corolla with larger points to the lobes, etc. A few rather puzzling intermediates occur which may be hybrids, and careful field-observations are wanted in this genus.

Trichodesma zeylanicum (Burm. f.) R. Br. Prodr. Fl. Nov. Holl. 496. 1810; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 51. 1905; Brand, Pflanzenreich **78** (4^{252}): 40. 1921.

Borago zeylanica Burm. f. Fl. Ind. 41. *pl. 14, f. 2.* 1768.

Zomba District: Zomba Plateau, one example found in *Brachystegia* woodland, herb 40 cm. high, stems reddish, more or less fleshy, flowers white, 1500 m., June 6, 1946, *16280**. Tropics and subtropics of the Old World.

CONVOLVULACEAE

Ipomoea nr. **blepharophylla** Hall. f. Bot. Jahrb. **18**: 125. 1893.

Dedza District: Dedza, sporadic in *Brachystegia* woodland, perennial herb 4–7 cm. high, flowers pink, young shoots flowering after the burning of the grass.

The flowers of *Brass 17637* are smaller than those of typical *I. blepharophylla*, but the material is too scanty to classify satisfactorily at present. Similar plants have been collected in Nyasaland and N. and S. Rhodesia.

Ipomoea tenuirostris Choisy in DC. Prodr. **9**: 379. 1845; Bak. & Rendle in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 143. 1905.

Kota-kota District: Nchisi Mountain, in shrubberies bordering lower montane forest, common vine 2–3 m. high, flowers pale purple with dark purple "eye," 1600 m., July 26, 1946, *16957*. Nchisi, in *Brachystegia* woodlands, vine, flowers purple-pink, 1350 m., Sept. 8, 1946, *Vernay 17569**. Cholo District: Cholo Mountain, common in rain-forest regrowths, vine 2–3 m. high, flowers whitish with purple throat, 1200 m., Sept. 19, 1946, *17649*. Eritrea and Anglo-Egyptian Sudan to N. Rhodesia and Nyasaland.

Ipomoea operosa C. H. Wright, Kew Bull. **1897**: 275. 1897; Bak. & Rendle in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 151. 1905.

Mlanje District: Mlanje Mountain, west slope, frequent in brushy growths on steep rock-slopes, vine about 2 m. high, flowers pink, showy, 1650 m., July 18, 1946, *16874*. Belgian Congo (fide Lebrun, Taton & Toussaint, Contr. Etude Parc Nat. Kagera 114. 1948), southern Tanganyika Territory, and Nyasaland.

Ipomoea wightii (Wall.) Choisy, Mém. Soc. Phys. Genève **6**: 470. 1833; in DC. Prodr. **9**: 364. 1845; Bak. & Rendle in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 157. 1905.

Convolvulus wightii Wall. Pl. Asiat. Rar. 55. *pl. 171.* 1831.

Cholo District: Cholo Mountain, occasional in second growths of rain-forest, vine 2 m. high, sap milky, flowers purple with darker purple throat, 1200 m., Sept. 19, 1946, *17647*. Uganda to Natal and the Transvaal; also in Madagascar and tropical Asia.

Ipomoea pes-tigridis L. Sp. Pl. 162. 1753; Bak. & Rendle in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 158. 1905; van Ooststroom, Blumea **3**: 504. 1940.

Chikwawa District: Lower Mwanza River, trailing on sandy beaches, vine, flowers pale purple, 180 m., Oct. 6, 1946, *18022*. Widely spread on the eastern side of tropical Africa, rare in West Africa; also in tropical Asia and (fide van Ooststr. l.c.) in the Mascarene Islands.

Ipomoea aquatica Forsk. Fl. Aegypt.-Arab. 44. 1775; Bak. & Rendle in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 170. 1905; van Ooststroom, Blumea **3**: 528. 1940.

Ipomoea reptans sensu Poir. ex Roem. & Schult. Syst. Veg. **4**: 244. 1819; non *I. reptans* (L.) Poir. l.c. quoad typo.

Chikwawa District: Lower Mwanza River, trailing on moist sandy beaches, herb, stems 3–4 m. long, sap milky, flowers pink, 180 m., Oct. 4, 1946, *17966*. Tropical Africa, Asia, America, and reaching Australia.

Ipomoea reptans (L.) Poir. is usually said to date from Lam. Encyc. Suppl. **3**: 460 (1813), but although Poiret here suggested that *Convolvulus reptans* L. should be transferred to *Ipomoea*, he did not make the combination, which dates, apparently, from Roemer & Schultes' later work mentioned above.

However, this is by the way, for Merrill in Philipp. Jour. Sci. **59**: 451, 452 (1936) shows that *Convolvulus reptans* L. is not what it has been usually assumed to be, but is the Asiatic *Merremia hirta* (L.) Merr.; a photograph of the

Linnean type-specimen of *Convolvulus reptans* is given on the plate accompanying Merrill's paper.

Ipomoea cairica (L.) Sweet, Hort. Brit. 287. 1827; van Ooststroom, Blumea **3**: 542. 1940.

Convolvulus cairicus L. Syst. ed. 10. 922. 1759.
Ipomoea palmata Forsk. Fl. Aegypt.-Arab. 43. 1775; Bak. & Rendle in Thiselton-Dyer, Fl. Trop. Afr. **4²**: 178. 1905.

Kota-kota District: Kota-kota, in swampy grassland, shrub, flowers purple-red, 460 m., Aug. 1946. *Vernay 17404**. Benga, west shore of Lake Nyasa, plentiful on sandy beaches, vine 2–3 m., climbing or creeping on sand, flowers purple, throats darker purple, 470 m., Sept. 2, 1946, *17495*. Tropics of Old and New Worlds, extending to South Africa.

Ipomoea shirambensis Bak. Kew Bull. **1894**: 72. 1894; Bak. & Rendle in Thiselton-Dyer, Fl. Trop. Afr. **4²**: 186. 1905.

Chikwawa District: Chikwawa, plentiful in dry brushy forest of river-banks, vine 3–6 m. high, flowers purplish-white with purple centre, 200 m., Oct. 5, 1946, *17992*. Tanganyika Territory, Portuguese East Africa, Nyasaland, N. and S. Rhodesia.

The type-specimen of *I. shirambensis* is leafless, but the leaves are normally more or less pubescent. *Brass 17992* is a form with glabrous leaves. *I. shirambensis* was placed by Baker and Rendle in § *Eriospermum*, but its closest relative is *I. shupangensis* Bak. Kew Bull. **1894**: 73 (1894), placed by Baker and Rendle in § *Leiocalyx*. *I. shirambensis* differs from *I. shupangensis* by the much shorter peduncles, the smaller not white flowers, and the less verrucose twigs.

Ipomoea riparia G.Don, Gen. Syst. **4**: 265. 1838.

Ipomoea lilacina Bl. Bijdr. Ned. Ind. **13**: 716. 1825; Bak. & Rendle in Thiselton-Dyer, Fl. Trop. Afr. **4²**: 187. 1905; non *I. lilacina* Schrank, Denkschr. Bot. Ges. Regensb. **2**: 31. 1822.

Kota-kota District: Benga, west shore of Lake Nyasa, climbing on vegetation of sandy lake shore, vine 2 m., flowers pink, showy, 470 m., Sept. 2, 1946, *17483*. Widespread in tropical Africa; also in tropical Asia and America, and the Mascarene Islands.

Merremia tridentata (L.) Hall. f. Bot. Jahrb. **16**: 552 (1893)[42] subsp. **angustifolia** (Jacq.) van Ooststr. Blumea **3**: 323. 1939.

Ipomoea angustifolia Jacq. Ic. Rar. **2**: 10. *pl. 317*. 1788–1789.
Merremia angustifolia (Jacq.) Hall. f. Bot. Jahrb. **18**: 117. 1893; Bak. & Rendle in Thiselton-Dyer, Fl. Trop. Afr. **4²**: 111. 1905.

Chikwawa District: Lower Mwanza River, trailing on a sandy beach, herb, stems 1.5 m. long, flowers white, 180 m., Oct. 4, 1946, *17965*. Chikwawa, one specimen in dry woodland, perennial herb 40 cm. high, flowers pale yellow, 300 m., Oct. 5, 1946, *17991*.* The species in its typical form occurs in tropical Asia and Africa, where it is rare; subsp. *angustifolia* is widespread in tropical and South Africa; a third subspecies reaches tropical Australia.

In dealing with this species I follow the taxonomic views of van Ooststroom (l.c.)

Astrochlaena malvacea (Klotzsch) Hall. f. Bot. Jahrb. **18**: 121. 1893; Bak. & Rendle in Thiselton-Dyer, Fl. Trop. Afr. **4²**: 121. 1905.

Breweria malvacea Klotzsch in Peters, Reise Mossamb. Bot. 245. *pl. 37*. 1861.

Kota-kota District: Chia area, on sandy ridges of dry lake-plain woodlands, shrub 60–100 cm. high, flowers purple, 480 m., Sept. 6, 1946, *17547*; ibid., on grassy bank of a dry watercourse on lake-plain, shrub about 2 m. high, flowers purplish-pink, 480 m., Sept. 7, 1946, *17564*. Cholo District: Cholo, frequent on disturbed ground in *Brachystegia* woodland, shrub 1–1.5 m. high, flowers purple, showy, 840 m., Sept. 29, 1946, *17861*. Anglo-Egyptian Sudan and Eritrea to South Africa; also in northern Nigeria.

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[42] *Convolvulus tridentatus* L. Sp. Pl. 157. 1753.

Hewittia sublobata (L.f.) Kuntze, Rev. Gen. Pl. **2**: 441. 1891.
Convolvulus sublobatus L. f. Suppl. Pl. 135. 1781.
Convolvulus bicolor Vahl, Symb. Bot. **3**: 25. 1794.
Hewittia bicolor (Vahl) Wight & Arn. in Wight, Madras Jour. Lit. Sci. **5**: 22. 1837; Bak. & Rendle in Thiselton-Dyer, Fl. Trop. Afr. 4^2: 100. 1905.

Kota-kota District: Chia area, in dry watercourses on lake-plain, vine 2 m. high, flowers yellow, tube purple within, 480 m., Sept. 7, 1946, *17561*. Cholo District: Cholo Mountain, common in rain-forest regrowths, vine 2–3 m. high, flowers yellow with purple throat, 1200 m., Sept. 19, 1946, *17648*. Widespread in tropical Africa and Asia, extending in Africa southwards to Natal.

Van Ooststroom (Blumea **3**: 286. 1936) adopts *Shutereia* Choisy (1833) instead of *Hewittia* (1837), calling our plant *Shutereia sublobata* (L.f.) House. *Shuteria* Wight & Arn. (*Leguminosae*) is conserved against *Shutereia* Choisy. If *Shutereia* and *Shuteria* are considered different names, then van Ooststroom is right, if as orthographic variants, then *Hewittia* must be retained; which course is taken depends on the interpretation of Article 82 of the *International Code*. The examples illustrating this rule, in me at least, merely cause a state of confusion. The implication of conserving *Shuteria* against *Shutereia* is evidently that these are to be considered orthographic variants, and I therefore use *Hewittia* instead of following van Ooststroom.

I am indebted to the Librarian of the Linnean Society of London for kindly checking for me with the original the Wight and Arnott references.

Cuscuta kilimanjari Oliv. in Johnston, Kilimanj. Exp. 343. 1886, nom. nud.; Trans. Linn. Soc. II. Bot. 2: 343. 1887, cum descr.; Bak. & Rendle in Thiselton-Dyer, Fl. Trop. Afr. 4^2: 205. 1906; Yuncker, Mem. Torrey Club **18^2**: 187. 1932.

Kota-kota District: Nchisi Mountain, on an acanthaceous herb of rain-forest borders, 1200 m., July 31, 1946, *Vernay 17070**. Cholo District: Cholo Mountain, on an acanthaceous herb in forest regrowths, sepals reddish, corolla white, 1200 m., Sept. 19, 1946, *17643**; ibid., on an acanthaceous herb in rain-forest regrowths, herb, stems reddish, flowers cream, 1200 m., Sept. 22, 1946, *17745*; ibid., in rain-forest regrowths, on *Ipomoea* sp., plant pale yellow, flowers reddish-purple, 1200 m., Sept. 23, 1946, *17767*. Anglo-Egyptian Sudan (Imatong Mountains) and Abyssinia, southwards to the Transvaal.

SOLANACEAE

Solanum indicum L. Sp. Pl. 187. 1753; C. H. Wright in Thiselton-Dyer, Fl. Trop. Afr. 4^2: 232. 1906; Bitter, Repert. Sp. Nov. Beih. **16**: 7. 1923.

Kota-kota District: Nchisi Mountain, occasional on grassy edges of rain-forest, shrub about 1 m. high, flowers purple, fruits orange-red, native name (Chinyanja) ntula, 1400 m., Aug. 1946, *17128*. Cholo District: Cholo Mountain, occasional in rain-forest regrowths, tree or shrub 2–5 m. high, flowers purplish-white, fruit orange, globose, about 8 mm. in diameter, 1200 m., Sept. 21, 1946, *17712*. The species widespread in tropical Africa and Asia.

Bitter makes numerous subspecies and varieties of *S. indicum*, prematurely, I feel. The differences are difficult to grasp, and though the species is certainly variable, I am unconvinced that the units he defines are natural ones. I therefore prefer to treat *S. indicum* in a wide sense for the present.

Brass 17712 agrees with subsp. *distichum* (Schum. & Thonn.) Bitter, Repert. Sp. Nov. Beih. **16**: 13 (1923) (*Solanum distichum* Schum. & Thonn. Beskr. Guin. Pl. 122. 1827) var. *dichroanthum* (Damm.) Bitter, Repert. Sp. Nov. Beih. **16**: 18 (1923) (*S. dichroanthum* Damm. Bot. Jahrb. **53**: 340. 1915), previously known only from S. Rhodesia.

Brass 17128 is near var. *dichroanthum*, but the larger central ray to the stellate hairs on the upper side of the leaves approaches subsp. *rohrii* (C. H. Wright) Bitter, Repert. Sp. Nov. Beih. **16**: 23 (1923) (*S. rohrii* C. H. Wright, Kew Bull. **1894**: 128. 1894).

Solanum richardi Dun. Solan. Gen. Aff. Syn. 45. 1816; Bitter, Repert. Sp. Nov. Beih. **16**: 176. 1923.

Solanum acanthocalyx Klotzsch in Peters, Reise Mossamb. Bot. 232. 1861; C. H. Wright in Thiselton-Dyer, Fl. Trop. Afr. **4²**: 234. 1906.

Cholo District: Cholo, occasional on roadsides, shrub about 1 m. high, flowers purple, showy, fruit greyish-white, smooth, native name (Chinyanja) ntula, 1100 m., Sept. 29, 1946, *17870*. Belgian Congo, Tanganyika Territory, Portuguese East Africa, Nyasaland, Madagascar, and the Mascarenes (distribution mostly from Bitter, l.c.).

Solanum panduriforme Drège ex Dun. in DC. Prodr. **13¹**: 370. 1852; C. H. Wright in Thiselton-Dyer, Fl. Trop. Afr. **4²**: 214. 1906; Bitter, Repert. Sp. Nov. Beih. **16**: 268. 1923.

Solanum delagoënse Dun. in DC. Prodr. **13¹**: 349. 1852; Bitter, Repert. Sp. Nov. Beih. **16**: 250. 1923.

Chikwawa District: Lower Mwanza River, common in native gardens, shrub 1.5 m. high, flowers purple, fruit about 25 mm. in diameter, globose, yellow, native name (Chinyanja) tula, 180 m., Oct. 4, 1946, *17939*. Uganda to South Africa.

S. panduriforme is usually attributed to E. Mey. in Drège, Zwei Pflanzengeogr. Dokumente 147 (1843), but the name is there without any description.

I do not consider that the characters that Bitter uses to separate *S. delagoënse* and *S. panduriforme* are sufficient for species, and I prefer to follow Wright in considering them as one. In Bitter's classification *Brass 17939* would certainly come under *S. delagoënse* and not *S. panduriforme*.

Nicandra physalodes ("physaloides") (L.) Gaertn. Fruct. **2**: 237. *pl. 131, f. 2.* 1791.

Atropa physalodes L. Sp. Pl. 181. 1753.

Blantyre District: Blantyre, in *Brachystegia* woodlands, herb about 1.5 m. high, flowers lavender, fruit dry, 1100 m., June 17, 1946, *16340*. Native of S. America, now widely naturalised in the tropics and subtropics; but this is apparently the first record for Nyasaland.

SCROPHULARIACEAE

Diclis tenella Hemsl. Kew Bull. **1896**: 163. 1896; Hemsl. & Skan in Thiselton-Dyer, Fl. Trop. Afr. **4²**: 287. 1906.

Zomba District: Zomba Plateau, gregarious under shelter of rocks on an exposed bluff, herb 3–20 cm. high, flowers white, mottled with purple, 1500 m., June 2, 1946, *16158*. Cholo District: Cholo Mountain, gregarious under shade of an overhanging rock in rain-forest, herb 10–15 cm. high, flowers white, 1400 m., Sept. 20, 1946, *17666*. Endemic to Nyasaland.

Halleria elliptica Thunb. Prodr. Fl. Cap. 98. 1800; Hemsl. & Skan in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 296. 1906.

Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent on forest margins, occasional in grasslands, tree or shrub 2–4 m. high, making a compact, shapely shrub or small tree, branches erect, flowers orange-red, 1860 m., June 26, 1946, *16443*. Nyasaland, Portuguese East Africa, and South Africa.

The leaves are, on an average, rather thicker, larger, and less toothed on the tropical specimens than on those from South Africa, but in none of these things are they constantly distinct, and though the former may perhaps be worth separating as a variety, it should not in my opinion be made a different species. I very strongly suspect that more material will show that *H. ligustrifolia* Bak. from Madagascar cannot be kept apart from *H. elliptica*.

Sutera cf. **blantyrensis** Skan in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 304. 1906.

Kasungu District: Kasungu, open sandy bed of a stream, herb 30–50 cm. high, flowers yellow, 1000 m., Aug. 28, 1946, *17449*.

S. blantyrensis is endemic to Nyasaland. *Brass 17449* is young and lacks fruits, and, while it may be *S. blantyrensis*, it may also perhaps be a robust state of *S. micrantha* Hiern.

Lindernia lobelioides (Oliv.) Engl. Pflanzenw. Ost-Afr. C: 357. 1895; Hemsl. & Skan in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 340. 1906.

Vandellia lobelioides Oliv. Trans. Linn. Soc. **29**: 120. *pl. 121B*. 1875.

Mlanje District: Likubula, in an open marsh, herb about 30 cm. high, flowers blue, 820 m., June 27, 1946, *Vernay 16490*. Anglo-Egyptian Sudan, Uganda, Kenya, Tanganyika Territory, N. Rhodesia, and Nyasaland.

Veronica abyssinica Fres. Bot. Zeit. **2**: 356. 1844; Hemsl. & Skan in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 358. 1906.

North Nyasa District: Nyika Plateau, massed in shrubby clearing in forest, herb, stems prostrate and ascending, flowers blue, 2300 m., Aug. 13, 1946, *17199*. Widespread on the mountains of east tropical Africa from the Anglo-Egyptian Sudan and Abyssinia to Tanganyika Territory and Nyasaland, for which this is the first record; in west Africa found only on the Cameroon Mountain and Bamenda highlands in the British Cameroons.

Alectra cf. **kirkii** Hemsl. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 366. 1906; Melchior, Notizbl. Bot. Gart. Berlin **15**: 443. 1941.

Mlanje District: Likubula Gorge, in *Brachystegia* woodlands, herb 45 cm. high, purplish, ? a root-parasite, sepals and bracts green, corolla orange, 1200 m., June 21, 1946, *Vernay 16391**. Tanganyika Territory, Nyasaland, and Portuguese East Africa.

The specimen is too far past blooming to make out clearly the floral structure, hence the identification is not quite certain.

Alectra rigida (Hiern) Hemsl. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 369. 1906; Melchior, Notizbl. Bot. Gart. Berlin **15**: 436. 1941.

Melasma rigidum Hiern, Cat. Afr. Pl. Welw. **1**: 767. 1898.

Kota-kota District: Chia area, sporadic on moist edges of dambos, herb, flowers yellow, 480 m., Sept. 1, 1946, *17469**. Previously recorded only from Angola; new to Nyasaland.

Alectra sessiliflora (Vahl) Kuntze, Rev. Gen. Pl. **2**: 458. 1891; Melchior, Notizbl. Bot. Gart. Berlin **15**: 437. 1941; Troupin, Bull. Jard. Bot. Brux. **19**: 280. 1949.

Gerardia sessiliflora Vahl, Symb. Bot. **3**: 79. 1794.

Alectra melampyroides Benth. in DC. Prodr. **10**: 339. 1846; Hemsl. & Skan in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 371. 1906; non *Alectra melampyroides* (L. C. Rich.) Kuntze, Rev. Gen. Pl. **2**: 458. 1891.

Chikwawa District: Lower Mwanza River, one example on sandy beach of river, fleshy herb, flowers yellow, 180 m., Oct. 3, 1946, *17935**; ibid., occasional on sandy beaches, herb 30–50 cm. high, fleshy, flowers yellow, 180 m., Oct. 6, 1946, *18004*.

Distribution dubious. In a restricted sense *A. sessiliflora* is found from Nyasaland to South Africa, and in Madagascar, but I very much doubt whether *A. communis* Hemsl. and *A. arvensis* (Benth.) Merr. can be kept separate; if they are not, *A. sessiliflora* will have a wide distribution both in tropical Africa and Asia.

Buchnera trilobata Skan in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 378. 1906.

North Nyasa District: Nyika Plateau; Nchena-chena Spur, common in grasslands, herb 30–50 cm. high, flowers pink, 1900 m., Aug. 20, 1946, *17366*. Endemic to Nyasaland.

Buchnera peduncularis Brenan, sp. nov.

Buchnerae ensifoliae Engl. affinis, bracteis obtriangularibus abrupte cuspidatis necnon calycis dentibus quam tubo multo longioribus distincta; *B. buchneroidi* (S. Moore) Brenan (*Eylesia buchneroides* S. Moore) et *B. bangweolensi* R.E.Fr. aspectu approximans, foliis oblongis vel lanceolatis nec linearibus, corollae tubo extra glabro, necnon bractearum forma facile distinguenda.

Herba erecta, 20–80 cm. alta, siccitate nigricans, verisimiliter annua. *Caulis gracilis*, 1–2 mm. diametro, simplex vel sparse ramosus, subteres, ut videtur saepe purpurascens, inferne breviter et inconspicue pubescens, superne glaber. *Folia* omnia caulina (basilaribus anthesi omnino evanidis) opposita, oblonga vel oblongo-lanceolata, 8–20 mm. longa, (1–) 2–3 (–5) mm. lata, integra, basi sessilia, apice acuta, supra ubique, subtus ad costam marginesque tantum puberula, costa supra impressiuscula, subtus prominula, nervis aliis hâud cernendis. *Inflorescentiae* densae, capitatae vel breviter spicatae, plerumque 0.4–1 cm. longae, serius plus minusve elongatae et usque ad 4 cm. longae sed tamen densae, quasi longipedunculatae, caule foliis supremis minimis exceptis nudo 11–32 cm. longo suffultae. *Bracteae* omnino 3.5 mm. longae, 2.5 mm. latae, obtriangulares et abrupte cuspidatae, cuspide 0.8–1.4 mm. longa acuta, margine ciliolatae necnon glandulosae, aliter glandulis minimis inconspicuis exceptis glabrae vel subglabrae, ut videtur intense purpureae marginibus anguste scariosis necnon areolis duabus centralibus pallidis exceptis. *Bracteolae* lanceolatae vel lineari-lanceolatae, 2.75–3 mm. longae, 0.7–0.75 mm. latae, textura et indumento ut in bracteis. *Calyx* 3.5 mm. longus, more bractearum bracteolarumque vestitus, tubo 1–1.5 mm. longo, lobis 4 lanceolatis 2–2.5 mm. longis, quibus quinto postico minore 1 mm. longo nonnunquam adjecto. *Corolla* purpurea, tubo 5–5.5 mm. longo subrecto basi circiter 1.2–1.3 mm. diametro superne sensim angustato extra basi glabro apicem versus necnon intus pubescenti, lobis 5 patentibus 1.4–1.5 mm. longis, 1.2 mm. latis rotundato-ellipticis. *Antherae* 0.5–0.6 mm. longae, ellipticae, obtusae. *Ovarium* ovoideo-ellipticum, glabrum, 2 mm. longum, 1–1.1 mm. latum. *Stylus* 0.5 mm. longus, glaber. *Stigma* 0.5 mm. longum. *Capsula* ovoideo-subspherica, 2.5–3 mm. longa, 2.5–2.8 mm. lata, apice minute apiculata, calycem subaequans. *Semina* minuta, circiter 0.25 mm. longa, angulata, brunneonigrescentia, tenuiter lineata.

BELGIAN CONGO: Haut-Katanga: Elisabethville, 1460 m., Oct. 22, 1911, *Rev. F. A. Rogers 10096* (Herb. Kew.); ibid., Kisanga, 1939, *Quarré 4577* (Herb. Kew. ex Herb. Brussels, sub nomine erroneo *Buchnera attenuata* Skan).

NYASALAND: North Nyasa District: Nyika Plateau; Nchena-chena, frequent in *Brachystegia* woodland, herb 40–80 cm. high, flowers pale purple, 1340 m., Aug. 21, 1946, *17371* (TYPUS in Herb. Kew.).

N. RHODESIA: Ndola District: Bwana Mkubwa, on sand, 1370 m., July, 1909, *Rev. F. A. Rogers 8382* (Herb. Kew.). Mufulira, in open forest, inflorescence mauve, May 20, 1934, *Eyles 8308* (Herb. Kew.). 3 miles E. of Mufulira, in *Brachystegia* woodland, "laterite" area, stem erect, slender, bracts and calyx green, underside of petals pale mauve, inside darker mauve, 1220 m., June 13, 1948, *A. W. Cruse 371*. Mkushi District: Chiwefwe, flowers deep mauve, 1340 m., July 14, 1930, *J. Hutchinson & J. B. Gillett 3660* (pro parte, cum *B. randii* S. Moore mixta; Herb. Kew.).

This new species belongs to an apparently natural group within *Buchnera* that is not clearly separated in the *Flora of tropical Africa*, characterised by dense capitate or shortly oblong spikes which are glabrous or sparingly pubescent, small linear to narrowly lanceolate leaves, broad bracts, calyx-teeth normally four, rarely with a small fifth one, and short capsules up to about 3 mm. long. The genus *Eylesia* S. Moore is also to be included here.

The following key to the species involved may be useful:

Corolla-tube hairy outside.
- Cauline leaves linear, up to 1.5 mm. wide, tapering to a long, subulate, curled or twisted tip; calyx-teeth to ⅓ as long as the tube; plant much branched. *B. angolensis* Engl.
- Cauline leaves oblong to narrowly lanceolate, 2–3(–5) mm. wide, very rarely narrower, the apex acute but not long-tapering.
  - Bracts rhombic-ovate, acute, sharply keeled above, 5 mm. long; calyx-teeth less than half as long as the tube; corolla-tube about 7 mm. long. *B. ensifolia* Engl.
  - Bracts obtriangular-cuspidate, not keeled, 3.5 mm. long; calyx-teeth much longer than the tube; corolla-tube about 5–5.5 mm. long. *B. peduncularis* Brenan.

Corolla-tube glabrous outside; leaves linear, less than 2 mm. wide.
- Anticous calyx-teeth very short, about 0.75 mm., ¼–⅕ as long as the tube; bracts small, ovate, acute, incrassate, about 2.5 × 2.25 mm.; corolla-lobes about 2 mm. long. *B. strictissima* Engl. & Gilg.
- Anticous calyx-teeth much longer, 1.5–2 mm. long, about half as long as the tube.
  - Larger corolla-lobes 3–6 mm. long; bracts ovate, about 1.5 mm. wide; calyx about 4 mm. long. *B. ciliolata* Engl.
  - Larger corolla-lobes 1–2 mm. long.
    - Bracts ovate, about 2 mm. wide; leaves spreading; calyx 3 mm. long; larger corolla-lobes 1.6–2 mm. long. *B. buchneroides* Brenan.[43]
    - Bracts narrowed below, abruptly expanded above into a rounded or subreniform mucronate part 3.5–4 mm. wide; leaves ± appressed to the stem; calyx 4 mm. long; larger corolla-lobes 1 mm. long. *B. bangweolensis* R. E. Fr.

The above species are remarkably similar to each other in general facies but the inflorescence and the leaves provide valuable characters that seem very constant for each species.

Buchnera crassifolia Engl. Bot. Jahrb. **30**: 403. 1901; Hemsl. & Skan in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 385. 1906.

North Nyasa District: Nyika Plateau, occasional on edges of forest regrowths, perennial herb 40–60 cm. high, flowers purple, showy, 2340 m., Aug. 12, 1946, *17188*; ibid., common in open grasslands, perennial herb 30–50 cm. high, roots tuberous, leaves fleshy, flowers purple, conspicuous, 2300 m., Aug. 13, 1946, *17195*. SW. Tanganyika Territory and Nyasaland.

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[43] **Buchnera buchneroides** (S. Moore) Brenan, comb. nov

Eylesia buchneroides S. Moore, Jour. Bot. **46**: 311. 1908; Eyles, Trans. Roy. Soc. S. Afr. **5**: 475. 1916; Norlindh, Bot. Not. **1951**: 124. 1951.

Buchnera randii S. Moore, Jour. Bot. **38**: 467. 1900; Hemsl. & Skan in Thiselton-Dyer, Fl. Trop. Afr. 4^2: 387. 1906; Norlindh, Bot. Not. **1951**: 121. 1951.

Kota-kota District: Nchisi Mountain, common locally in *Brachystegia* woodland, herb 30–70 cm. high, flowers purple, 1400 m., July 24, 1946, *16911*. Belgian Congo, Portuguese East Africa, N. and S. Rhodesia, Angola, and now recorded for the first time from Nyasaland.

Buchnera nuttii Skan in Thiselton-Dyer, Fl. Trop. Afr. 4^2: 388. 1906.

North Nyasa District: Nyika Plateau; Nchena-chena Spur, scattered through long grass of spur, perennial herb 1–1.5 m. high, stems simple or sparsely branched, flowers white with purple throat, 1700 m., Aug. 20, 1946, *17358*. Belgian Congo, Kenya, N. Rhodesia, and now new to Nyasaland.

Buchnera similis Skan in Thiselton-Dyer, Fl. Trop. Afr. 4^2: 391. 1906.

Mlanje District: Mlanje Mountain; Luchenya Plateau, two plants in open grassland, perennial herb 60 cm. high, roots tuberous, purplish, flowers pink, 1860 m., June 26, 1946, *16431*; south-west ridge, scattered in grassy places on summit, perennial herb 30–50 cm. high, roots tuberous, purplish, flowers purplish-white, 2400 m., June 28, 1946, *16501*; Luchenya Plateau, in shelter of rocks in grasslands, herb, branches weak, spreading, purple, roots tuberous, flowers white, 2150 m., July 9, 1946, *16748*. Endemic to Nyasaland.

The stem of *16748* is profusely branched, of *16431* less so; the habit difference between *B. similis* and *B. lastii* Engl. noted by Skan (l.c.) thus disappears. The flowers of *B. similis* evidently vary from pink to white.

Buchnera eylesii S. Moore, Jour. Bot. **46**: 72. 1908; Norlindh, Bot. Not. **1951**: 124. 1951.

Buchnera mossambicensis Klotzsch var. *usafuensis* Engl. Bot. Jahrb. **30**: 404. 1901.
Buchnera leptostachya sensu Hemsl. & Skan in Thiselton-Dyer, Fl. Trop. Afr. 4^2: 394. 1906, pro parte; non *B. leptostachya* Benth.
Buchnera usafuensis (Engl.) Melchior, Notizbl. Bot. Gart. Berl. **11**: 680. 1932.

Kota-kota District: Nchisi, in moist gullies in *Brachystegia* woodland, shrub 2 m. high, flowers white, 1350 m., Sept. 8, 1946, *Vernay 17570*. Tanganyika Territory and S. Rhodesia, and now new to Nyasaland.

The above synonymy, not previously suggested, seems necessary.

Buchnera speciosa Skan in Thiselton-Dyer, Fl. Trop. Afr. 4^2: 394. 1906.

Kota-kota District: Nchisi Mountain, frequent in moist gullies in *Brachystegia* woodland, shrub about 2 m. high, slender and sparsely branched, flowers white, showy, 1400 m., July 25, 1946, *16928*. Endemic to Nyasaland.

S. Moore, admitting that his new genus *Eylesia* was closely related to *Buchnera*, separated it by the "curious 2-lipped calyx." I have dissected a flower of the type-number, *Eyles 366* from S. Rhodesia, and do not find the calyx to be at all 2-lipped—at least no more so than in those species of *Buchnera* with four calyx-teeth. The sinuses separating the pair of anticous from the pair of posticous lobes are no deeper than that between the two anticous lobes, and are shallower than that separating the two posticous ones. The calyx is distinctly fragile, and I suspect that S. Moore may have described a calyx that was split between the lobes. There is no reason anyhow for keeping up *Eylesia* as a distinct genus, and the above new combination is therefore made. Norlindh, Bot. Not. **1951**: 124 (1951), also expresses grave doubts about the generic distinctness of *Eylesia*.

Buchnera buchneroides has till now only been recorded from S. Rhodesia, but *Milne-Redhead 3760* (Herb. Kew.) from Mwinilunga District in N. Rhodesia is in my opinion the same.

Buchnera hispida Buch.-Ham. ex D. Don, Prodr. Fl. Nep. 91. 1825; Hemsl. & Skan in Thiselton-Dyer, Fl. Trop. Afr. 4²: 397. 1906.

Mlanje District: Likubula Gorge, locally common in *Uapaca-Brachystegia* woodland, 30–60 cm. high, lower leaves purplish, flowers purple, 840 m., June 20, 1946, *16380*. Widespread in tropical Africa; also in Madagascar and India.

Buchnera longifolia Klotzsch in Peters, Reise Mossamb. Bot. 225. 1861; Hemsl. & Skan in Thiselton-Dyer, Fl. Trop. Afr. 4²: 398. 1906.

Kasungu District: Kasungu; Kasungu Hill, on dry rocky slopes, herb 50–60 cm. high, leaves purplish, flowers white, 1100 m., Aug. 28, 1946, *17460*. Chikwawa District: Lower Mwanza River, one plant on a sandy beach, flowers blue, 180 m., Oct. 4, 1946, *17961**. Widespread in tropical Africa.

Cycnium adonense E. Mey. ex Benth. Comp. Bot. Mag. **1**: 368. 1836; Hemsl. & Skan in Thiselton-Dyer, Fl. Trop. Afr. 4²: 431. 1906; Norlindh, Bot. Not. **1951**: 125. 1951.

Cholo District: Cholo Mountain, one example in old garden land, herb 15 cm. high, flowers white, very conspicuous, 1200 m., Sept. 21, 1946, *17698**; ibid., sporadic in *Brachystegia* woodland, herb 30–40 cm. high, ascending, flowers white, very conspicuous, native name kamoto, 1200 m., Sept. 26, 1946, *17823*. Anglo-Egyptian Sudan to Uganda.

Sopubia ramosa (Hochst.) Hochst. Flora **27**: 27. 1844; Hemsl. & Skan in Thiselton-Dyer, Fl. Trop. Afr. 4²: 449. 1906.

Raphidophyllum ramosum Hochst. Flora **24**: 668. 1841.

Zomba District: Zomba, occasional in *Brachystegia* woodlands, herb 1 m. high, flowers rose-coloured, 1100 m., May 26, 1946, *16035*. Zomba Plateau, frequent in *Brachystegia* woodlands, herb 60–80 cm. high, flowers rose-pink, showy, 1430 m., May 30, 1946, *16082*. Widespread in tropical Africa.

Bartsia nyikensis R.E.Fr. Acta Horti Berg. **8**: 66. 1925.

North Nyasa District: Nyika Plateau, common locally on forest-edges, shrub 1–1.5 m. high, flowers pale purple to almost white, 2440 m., Aug. 11, 1946, *17169*. Endemic to the Nyika Plateau.

This is the first time this species has been collected since the type was gathered in 1902 by McClounie.

OROBANCHACEAE

Orobanche minor Sutton, Trans. Linn. Soc. 4: 179. 1797; Stapf in Thiselton-Dyer, Fl. Trop. Afr. 4²: 467. 1906; G. Beck, Pflanzenreich 96(4²⁶¹): 205. 1930.

Mlanje District: Mlanje Mountain; west slope, occasional on paths in *Brachystegia* woodland, herb 20–40 cm. high, stem purplish-red, fleshy, flowers pale purple, about 1000 m., June 24, 1946, *16410*. Kota-kota District: Nchisi, one plant, on path in *Brachystegia* woodland, herb 35 cm. high, leafless, purple-red, flowers purple, 1350 m., Aug. 1, 1946, *17073**. Cholo District: Cholo Mountain, two examples in *Brachystegia* woodland, herb 20–30 cm. high, stem purplish, fleshy, flowers pale purple, 1200 m., Sept. 26, 1946, *17827**. Mediterranean Region and Europe, north to Britain, France, and Germany; in east Africa from Eritrea southward to Nyasaland; introduced into the United States and New Zealand.

LENTIBULARIACEAE[44]

Utricularia odontosperma Stapf in Thiselton-Dyer, Fl. Trop. Afr. 4²: 474. 1906.

Zomba District: Zomba Plateau, massed on moist banks near water in *Brachystegia* woodlands, 8–12 cm. high, flowers purple, showy, 1100 m., May 26, 1946,

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[44] By P. Taylor, Royal Botanic Gardens, Kew.

*16033**; ibid., massed on sunny seepage slopes, herb 5-15 cm. high, flowers purple, with two yellow blotches on lower lip, 1500 m., June 5, 1946, *16237*. Mlanje District: Mlanje Mountain; Luchenya Plateau, scattered amongst short grass on rocky seepage slopes, herb 5-10 cm. high, corolla purple, with two yellow spots on lip, 1860 m., June 26, 1946, *16432*. Nyasaland and SW. Tanganyika Territory.

Utricularia exilis Welw. ex Oliv. Jour. Linn. Soc. Bot. 9: 154. 1867.

Mlanje District: Mlanje Mountain; Luchenya Plateau, scattered on wet mossy rocks on a grass slope, 3-5 cm. high, flowers purple with two yellow blotches on lower lobe, 2140 m., June 27, 1946, *16469*; ibid., commonly scattered on wet mossy banks of a forest stream, herb 2-5 cm. high, flowers purple with two yellow spots on lower lip, 1750 m., July 5, 1946, *16667*. From the Anglo-Egyptian Sudan to Nyasaland and Angola; also in West Tropical Africa.

Utricularia pentadactyla P. Taylor, sp. nov.

U. ecklonii Spreng. affinis sed labio inferiore valde lobato et labio superiore multo angustiore differt.

Herba terrestris, erecta, gracilis, 8-12 cm. alta. *Stolones* filiformes, ramosi; rhizoidea capillaria e pedunculi basi exorta. *Folia* pauca, secus stolones dispersa, anguste cuneato-spathulata, usque 4 mm. longa et 1 mm. lata, marginibus minute papillosis, sensim in petiolum tenuem coartata. *Utriculi* stolonibus affixi, ovoidei usque globosi, 0.5-1.0 mm. longi, bilabiati; labium superius suborbiculare, inferius minimum, utrumque pilis glandulosis in lineis parallelis dispositis ciliatum; utriculi stipes circiter 0.3 mm. longus, ori oppositus. *Pedunculus* strictus vel leviter flexuosus, simplex, squamis minutis parce instructus, parte inferiore papilloso-hirsutus.

Flores remoti, 2-4; bracteae et bracteolae subaequales, basifixae, lanceolatae, acuminatae, circiter 1 mm. longae; pedicelli bracteis aequilongi vel iis paullo longiores. *Sepala* 2, subaequalia, concava, minute papillosa; sepalum superius suborbiculare, circiter 1.5 mm. longum, integrum, inferius ovatum, usque 2 mm. longum, integrum vel emarginatum. *Corolla* caduca, e calcaris apice usque ad labii superioris apicem 5-6 mm. longa. Labium superius flavidum, minute papillosum, dimidio basali ovatum, dimidio superiore anguste elongato-cucullatum, apice emarginato inflexo, 3-3.5 mm. longum, basi 1.5 mm. latum, apice 0.5 mm. latum. Labium inferius purpureum, circiter 4 mm. longum et 4 mm. latum, in lobos 3 primarios divisum, lobo centrali iterum alte trifido, lobis incurvatis; lobus centralis quam laterales longior et latior. Palatum flavidum, antice visum ut videtur truncatum, leviter 3 -gibbosum, minute papillosum. Calcar flavidum, sat tenue, conicum, labio inferiori ± parallelum, incurvatum, circiter 4 mm. longum, apice leviter emarginatum vel integrum, minute papillosum. *Antherae* 0.8 mm. longae; filamenta inflexa, antheris ± aequilonga, alata, usque 0.25 mm. lata. *Ovarium* ovoideum; stigma fere sessile, bilabiatum, labio inferiore late ovato, labio superiore multo minore ovato basi angustato. *Capsula* globosa, circiter 2 mm. diametro. *Semina* minuta, ovoidea vel pyriformia, minutissime reticulata, circiter 0.25 mm. longa.

NYASALAND: Mlanje District: Mlanje Mountain; Luchenya Plateau, in shelter of grass edging seepage-wet rocks, herb 1.5-10 cm. high, lower lip purple with yellow pulvinus, apex of spur purple, other flower parts yellow, 1860 m., June 26, 1946, *16433**. Mlanje Mountain, damp rocks in alpine pasture zone, corolla purple, 1650 m., June 1937, *Thomas s.n.* (Herb. Mus. Brit.).

SOUTHERN RHODESIA: Salisbury District: Dombashawa, by rill over granite, stem erect or somewhat geniculate, lower lip purple, palate and rest of flower yellowish, 1560 m., March 8, 1950, *Wild 3240* (TYPUS in Herb. Kew.). Chindamore Reserve, Ngomakuriram, in damp ground by rill over granite, flower pale mauve, palate yellowish, 1680 m., March 25, 1952, *Wild 3778*.

NORTHERN RHODESIA: Abercorn District: Kali Dambo near Kawembi Mission, in wet muddy marsh, sparingly, flowers mauve, 1550 m., May 6, 1952, *Richards 1635A*. Dhulu'miti, in marsh, flowers mauve, 1550 m., April 19, 1952, *Richards 1463A*.

GESNERIACEAE[45]

Streptocarpus goetzei Engl. Bot. Jahrb. **30**: 406. 1901.

Streptocarpus rungwensis Engl. Bot. Jahrb. **57**: 217. 1921.

Zomba District: Zomba Plateau, herb, leaves solitary, pendent, apex pale green, base dark green, frequent on mossy rocks in riverine rain-forest, 1400 m., May 28, 1946, *16058*; ibid., flower violet, very attractive, common on moist mossy rocks in rain-forest, 1400 m., May 30, 1946, *16081**; ibid., herb, common, but seldom seen in flower, flowers violet, on moist mossy rock faces in rain-forest, 1450 m., June 4, 1946, *16198**; ibid., herb seldom seen in flower, flower purplish-violet, common on moist mossy rocks in riverine rain-forest, 1500 m., June 7, 1946, *16294**. Mlanje District: Mlanje Mountain; Luchenya Plateau, herb, an exceptionally large leaf measured 50 cm. long and 27 cm. wide, common on rocks and tree trunks in primary forest, 1890 m., July 12, 1946, *16813*. Cholo District: Cholo Mountain, common on rocks in rain-forest, herb, flowers violet, leaves solitary, pendent, 1400 m., Sept. 20, 1946, *17670**. Nyasaland and southern Tanganyika.

In some recent notes on *Streptocarpus* (Kew Bull. **1939**: 70. 1939) I indicated that, from the somewhat scanty material then available, I was unable to separate *S. goetzei* and *S. rungwensis*. Brass' gatherings have greatly increased the material available for examination, but they give no indication of belonging to more than one species and I therefore maintain my previous treatment.

When writing of *S. comptonii* Mansf. (l.c.), I mentioned that it showed a tendency towards cleistogamy, a phenomenon that was then known among the cultivated unifoliate species of the genus (that is, subgen. *Streptocarpus*) and amongst wild caulescent species (that is, subgen. *Streptocarpella*), but had not been recorded among wild species of subgen. *Streptocarpus*. This gap may now be filled, for an examination of *16081* and *16198* shows clearly the short undeveloped cleistogamous corollas adhering to the fruits. In *16081* chasmogamous flowers are present on the same plant.

The morphology of cleistogamous flowers in *Streptocarpus* is now well-known (cf. Engler, Bot. Jahrb. 57: 202. 1921; Hill, Proc. Linn. Soc. **154**: 1. 1942), and in the caulescent *S. nobilis* C. B. Clarke, Lawrence (Gard. Chron. **113**: 156. 1943) has demonstrated the controlling effect of the length of photo-period in the early stages of development, for, if the daily light period falls below about 11 hours in the seedling phase, the whole plant is dwarfed and only cleistogamous flowers are produced. It is nevertheless true that under more favourable conditions some cleistogamous flowers may be found in a normal inflorescence (as they are in this wild material of *S. goetzei*), and the precise conditions which determine whether a particular bud shall become cleistogamous or chasmogamous have yet to be investigated.

Streptocarpus hirtinervis C. B. Clarke in Thiselton-Dyer, Fl. Cap. 4^2: 446. 1904, quoad descr.; in Thiselton-Dyer, Fl. Trop. Afr. 4^2: 507. 1906.

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[45] By B. L. Burtt, Royal Botanic Gardens, Kew (now at Royal Botanic Garden, Edinburgh).

Mlanje District: Mlanje Mountain; Chambe Plateau, herb, leaves silvery-grey, common locally on dry exposed rocks on open grasslands, 2100 m., July 9, 1946, *16760**.

I have previously pointed out (Kew Bull. **1939**: 71. 1939) that this species is endemic in Nyasaland, and that the S. African specimen associated with it by C. B. Clarke must be excluded.

S. hirtinervis has hitherto been known only in the flowering condition; from Brass' gathering it is possible to add the following information:—"fruit about 3.5 cm. long and 2 mm. in diameter."

BIGNONIACEAE

Tecomaria nyassae (Oliv.) Baill. ex. K. Schum. in Engl. & Prantl. Nat. Pflanzenf. 4^{3B}: 230. 1894; K. Schum. in Engl. Pflanzenw. Ost-Afr. C: 363. 1895; Sprague in Thiselton-Dyer, Fl. Trop. Afr. $\mathbf{4}^2$: 514. 1906.

Tecoma nyassae Oliv. Hook. Ic. Pl. *pl. 1351*. 1881.

Tecoma shirensis Bak. Kew Bull. **1894**: 30. 1894.

Tecomaria shirensis ("schirensis") (Bak.) K. Schum. in Engl. Pflanzenw. Ost-Afr. C: 363. 1895; Sprague in Thiselton-Dyer, Fl. Trop. Afr. $\mathbf{4}^2$: 515. 1906.

Tecomaria rupium Bullock, Kew Bull. **1931**: 274. 1931.

Zomba District: Zomba Plateau, locally common on roadsides in rain-forest gullies, tree or shrub 3–5 m. high, escaped from cultivation?, flowers orange-red, showy, 1450 m., June 5, 1946, *16256*. Mlanje District: Mlanje Mountain, common on rocky slopes, shrub 2 m. high, flowers orange-red, about 1830 m., July 10, 1946, *Vernay 16772*. Kota-kota District: Nchisi Mountain, rocky situations in *Brachystegia* woodland, shrub 3–4 m. high, flowers orange-yellow, attractive, 1400 m., July 24, 1946, *16886*. North Nyasa District: Nyika Plateau, common in montane forest second-growths, shrub 3–4 m. high, flowers orange, showy, only one mature fruit, 2100 m., Aug. 20, 1946, *17343*. Tanganyika Territory (particularly in the Southern Highlands Province), Nyasaland, and N. Rhodesia.

I cannot see that any useful purpose is served by keeping three distinct species for these plants. Every intermediate between the acuminate leaflets of typical *T. shirensis* and the obtuse leaflets of *T. nyassae* may be found, sometimes on one plant. *T. rupium* is simply a more pubescent form of *T. nyassae*, and here too there are far too many intermediates for much importance to be given it.

Stereospermum kunthianum Cham. Linnaea **7**: 721. 1832; Sprague in Thiselton-Dyer, Fl. Trop. Afr. $\mathbf{4}^2$: 518. 1906.

Kota-kota District: Kota-kota, edges of village, tree 10 m. high, flowers rose-pink, 460 m., Aug. 7, 1946, *Shortridge 17394**. Chia area, one example on stream-bank in dry woodland of lake-plain, tree 20 m. high and 35 cm. in diameter, deciduous, a few leaves remaining on sterile branchlets, bark smooth, greenish, flowers pink, opening before the new leaves appear, the "pink jacaranda" of European residents, 480 m., Sept. 3, 1946, *17520*. ? District: Roadside between Blantyre and Chikwawa, frequent in *Brachystegia* woodland, tree 6–10 m. high, flowers pale purple, showy, 600 m., Oct. 1, 1946, *17883*. Chikwawa District: Chikwawa, frequent in dry woodlands, tree 5–8 m. high, flowers purple-pink, 300 m., Oct. 5, 1946, *17982*. Widespread in tropical Africa.

A very variable plant in size and shape of leaflets, in indumentum, and other characters.

Kigelia pinnata (Jacq.) DC. Prodr. **9**: 247 (1845)[46] var. **tomentella** Sprague in Thiselton-Dyer, Fl. Trop. Afr. $\mathbf{4}^2$: 537. 1906.

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[46] Sprague in Thiselton-Dyer, Fl. Trop. Afr. $\mathbf{4}^2$: 537. 1906. *Crescentia pinnata* Jacq. Collect. **3**: 203. *pl. 18*. 1789.

Kota-kota District: Kota-kota, on lake-shore, tree, flowers maroon with golden-yellow, 460 m., Aug. 1946, *Vernay 17400**. Chia area, common on alluvial soils in dry woodlands of lake-plain, tree to 25 m. high and 75 cm. in diameter, fruit 30–40 cm. long, laterally compressed, flowers dark reddish wine-colour, native name (Chinyanja) vunguti, 480 m., Sept. 4, 1946, *17532*; ibid., common on alluvial soils of dry lake-plain, tree to 25 m. and 75 cm. in diameter, branchlets sometimes myrmecophilous, panicles to over 1 m. long, pendent from swollen branches or last pair of leafless branchlets, flowers dark reddish wine-colour, fruit 30–40 cm. long, laterally compressed, native name vunguti, 480 m., Sept. 7, 1946, *17557*. Kasungu District: Kasungu, scattered in old garden lands, tree about 15 m. high and 40–50 cm. in diameter, shapely, deciduous, young leaves only, racemes pendent, to 1 m. long, flowers maroon, visited by bats, lobes much crinkled, fruit 35–40 cm. long, grey, native name mvunguti, 1000 m., Aug. 27, 1946, *17444*. Chikwawa District: Lower Mwanza River, common on alluvial flats, tree 15–25 m. high and to 0.6 m. in diameter, inner surface of flowers maroon, outer yellow-green, fruit 40–50 cm. long, native name vunguti, 180 m., Oct. 4, 1946, *17947*. The variety in N. and S. Rhodesia, Nyasaland, Portuguese East Africa, and Bechuanaland; the species in N. Rhodesia, Nyasaland, Portuguese East Africa, Bechuanaland, the Transvaal, Swaziland, Natal, and Zululand.

PEDALIACEAE

Sesamum angolense Welw. Apont. Phyto-Geogr. 588. 1858; Trans. Linn. Soc. **27**: 51. 1869; Stapf in Thiselton-Dyer, Fl. Trop. Afr. **4**^{2}: 555. 1906.

Kota-kota District: Nchisi Mountain, common on open roadsides, shrub 2 m. high, foetid, flowers mauve, showy, 1300 m., July 29, 1946, *17014*. Uganda to Nyasaland, N. Rhodesia, and Angola.

ACANTHACEAE[47]

Thunbergia subalata Lindau, Bot. Jahrb. **17** (Beibl. 41): 38, 41. 1893.

Dedza District: Dedza, sporadic in *Brachystegia* woodland, subprostrate, young shoots flowering after the burning of the grass, flower yellow, conspicuous, 1500 m., Sept. 13, 1946, *17631*. Nyasaland and Nyassa Province of Portuguese East Africa.

Thunbergia alata Boj. ex Sims, Bot. Mag. **52**: *pl. 2591*. 1825.

Cholo District: Cholo Mountain, frequent in rain-forest regrowths, vine 2 m. high, flowers pale yellow with purple throat, 1200 m., Sept. 19, 1946, *17655*. Widely spread throughout tropical Africa, south to Natal; introduced into other tropical countries.

The species is a common and variable one. Mr. Brass' specimen lacks the wing to the petiole, which places it in either var. *vixalata* Burkill or var. *reticulata* (Nees) Burkill (see Burkill in Thiselton-Dyer, Fl. Trop. Afr. **5**: 16, 17. 1899). In indumentum the specimen approaches the former of these two varieties, but the indumentum character, being a quantitative one, is not satisfactory. The veins on the lower surface of the leaves agree well with var. *retinervia* Burkill (in Thiselton-Dyer, Fl. Trop. Afr. **5**: 17), but the bracteoles are not apiculate. Since there is, in the plentiful material now preserved at Kew, a complete gradation from strongly winged petioles to petioles that are without wings, I find that none of these varieties can satisfactorily be maintained.

Nelsonia canescens (Lam.) Spreng. Syst. Veg. **1**: 42. 1825.

Justicia canescens Lam. Tab. Encyc. **1**: 41. 1791.

Nelsonia campestris R. Br. Prodr. Fl. Nov. Holl. 481. 1810.

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[47] By E. Milne-Redhead, Royal Botanic Gardens, Kew.

Kota-kota District: Kota-kota, grass country, herb, flowers purple, 1500 m., Aug. 7, 1946, *G. C. Shortridge in Brass 17396*. Widely spread through the tropics.

Hygrophila cataractae S. Moore, Jour. Linn. Soc. Bot. **37**: 459. 1906.

Kota-kota District: Chia area, gregarious on muddy edges of waterholes, herb 30–50 cm. high, ascending, flowers white, the lower lip faintly mottled with purple, 480 m., Sept. 3, 1946, *17513*; ibid., gregarious on moist muddy banks of waterholes, ascending herb, 50–70 cm. high, flowers white, the lower lip mottled with purple, 480 m., Sept. 5, 1946, *17534*. Hitherto known only from the Victoria Falls.

Hygrophila spiciformis Lindau, Bot. Jahrb. **20**: 5. 1894.

Kasungu District: Kasungu, common in open sandy bed of stream, herb about 30 cm. high, ascending, viscid, 1000 m., Aug. 28, 1946, *17446*. Abyssinia, Uganda, south to S. Rhodesia and Portuguese East Africa; new to Nyasaland.

Brillantaisia pubescens T. Anders. ex Oliv. Trans. Linn. Soc. **29**: 125. 1875.

Brillantaisia anomala Lindau in Engl. Pflanzenw. Ost-Afr. **C**: 366. 1895.

Kasungu District: Kasungu, gregarious on dry shady banks of a stream, herb 40–60 cm. high, viscid, aromatic, ascending or suberect, flowers purple, 1000 m., Aug. 27, 1946, *17442*. Chikwawa District: Lower Mwanza River, plentiful in bushy dry forest, herb 60–80 cm. high, viscid, aromatic, flower pale purple, 180 m., Oct. 4, 1946, *17942*. Nyasaland, Tanganyika, and Portuguese East Africa.

Brillantaisia anomala Lindau appears to be a late-season state of *B. pubescens* in which the leaves have all fallen and the flowers are relatively small and most probably cleistogamous. *Brass 17942* represents this state.

Brillantaisia oligantha Milne-Redhead, sp. nov.

Proxima est ut videtur *B. debili* Burkill, sed statura et foliis majore, caulibus et foliis pubescentibus, staminodiis glabris facile distinguenda.

Herba perennis usque 6 dm. alta. *Caules* obscure quadrangulares, haud alati, superne pilis albis usque 3 mm. longis patentibus, pilis brevioribus glanduloso-capitatis et pilis brevissimis reflexis parce vestiti, inferne glabrescentes, cystolithis densiuscule instructi. *Folii* lamina ovata, apice acuta vel leviter acuminata, basi cuneata in petiolum decurrens, usque 16 cm. longa et 9.5 cm. lata, margine obscure crenulata, supra pilis paucis brevibus ad nervos parce dispersis, subtus praesertim ad nervos puberula, utrinque cystolithis instructa; costa et nervi laterales utraque pagina 6–8, leviter arcuata vel nervi inferiores costam versus plus minusve recti; petiolus usque 10 cm. longus, superne lamina decurrente alatus, basin versus pilis albis patentibus et pilis glandulo-capitatis vestitus. *Cymae* paucae, ex axillis foliorum superiorum valde reductorum ortae, 3–4-florae. *Pedunculus* patens vel adscendens, 2.5–3.5 cm. longus, pilis albis longis, pilis brevioribus glandulo-capitatis et pilis brevissimis densiuscule vestitus. *Bracteae* ovatae vel ellipticae, plus minusve petiolatae, inferiores circiter 8 mm. longae, superiores minores. *Calyx* profunde lobatus; tubus vix 2 mm. longus; lobus posticus quam alteris leviter longior et latior; lobi ligulati, circiter 7 mm. longi, apice obtusiusculi, extra pilis glandulo-capitatis dense induti, intus glabri. *Corolla* circiter 2.5 cm. longa; tubus inferne cylindricus, superne inflatus, circiter 1.1 cm. longus; labium anticum circiter 1.3 cm. longum et 1.2 cm. latum, apice trilobatum; lobi subaequales, circiter 4 mm. longum et 3 mm. latum, apice rotundatum; labium posticum arcuatum, cucullatum, apice bilobatum; corolla extra breviter hirsuta et minute glandulosa intus medium versus labii antici pilis longis septatis instructa, cetera glabra. *Stamina* 2, in labio postico arcuata; filamenta circiter 12 mm. longa, superne glabra, basi supra staminodia breviter hirsuta; antherae 3 mm. longae; staminodia minutissima, vix 1 mm. longa, glabra. *Ovarium* glabrum, 3 mm. longum;

stylus filiformis, circiter 2–3 cm. longus, pubescens; stigmatis lobus anticus vix 2 mm. longus, posticus ad dentem minutum redactus. *Fructus ignotus.*

Kota-kota District: Nchisi Mountain, in rain-forest undergrowth, herb 50 cm. high, flowers with upper lip brown, lower lip purple, 1500 m., July 29, 1946, *17021**; ibid., locally common in rain-forest undergrowth, herb 40–60 cm. high, young parts and inflorescence viscid, flowers with upper lip purple, lower lip brown, 1500 m., July 30, 1946, *17042* (TYPUS in Herb. Kew.); ibid., common in openings in rain-forest, Sept. 5, 1929, *Burtt Davy 21281* (Herb. Kew.).

I can find no close relatives of this species in eastern Africa. It appears to come nearest to *B. debilis* Burkill from the Cameroons, but is abundantly distinct from it. A poor hitherto un-named specimen collected by Burtt Davy is the only other gathering of the species that I can find, and it also comes from Nchisi. It seems that *B. oligantha* is an endemic species in the forests of that mountain.

Mimulopsis solmsii Schweinf. Verh. Zool.-Bot. Ges. Wien **18**: 677. 1868.

Mimulopsis violacea Lindau, Bot. Jahrb. **17**: 185. 1893.

Mimulopsis thomsoni C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. **5**: 55. 1899.

Mimulopsis spathulata C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. **5**: 55. 1899.

Mimulopsis glandulosa (Lindau) Bullock, Kew Bull. **1931**: 275. 1931, quoad synon. *M. thomsoni*, haud *Epiclastopelma glandulosum* Lindau, non *M. glandulosa* Bak. Jour. Linn. Soc. Bot. **25**: 338. 1890, comb. illegit.

Mimulopsis velutinella Mildbr. Bull. Jard. Bot. Brux. **17**: 86. 1943.

Zomba District: Zomba Plateau, in grassy edges of rain-forest, herb 2 m. high of weak scrambling habit, flowers lavender with a yellow blotch on the lower lip, 1450 m., June 3, 1946, *16181*. British Cameroons and highlands from Abyssinia, eastern Belgian Congo to S. Rhodesia.

I have been unable to consider the species whose names appear above to represent more than a single variable species. There has been much confusion in the past caused by a number of unrelated circumstances. Schweinfurth described *M. solmsii* as having yellow flowers. Whilst it cannot be proved that this was an incorrect statement, circumstantial evidence strongly suggests that the colour of the corollas was not yellow when the plant was growing. They dry, however, just as if they had been yellow when fresh, which fact may have helped to suggest his choice of name for the genus. All the specimens that have been examined of the above-mentioned species, to which collector's colour notes are attached, have white or white-tinged lavender, violet, or mauve corollas. There is, however, a yellow spot or honey-guide inside the inferior lip.

Epiclastopelma glandulosum Lindau, which is said to have yellow flowers, was in my opinion wrongly placed by Clarke under *Mimulopsis thomsoni*. It seems from description and from observations by Mildbraed (Notizbl. Bot. Gart. Berl. **11**: 1081. 1934) that the genus *Epiclastopelma* is distinct from *Mimulopsis* and should be maintained. Material collected recently by Mr. A. A. Bullock confirms my opinion that *Epiclastopelma* is a distinct genus of which at least one species has not yellow flowers. The Thomson specimens cited by Clarke under *M. thomsoni* have no colour notes, so that the key character "corolla yellow" in the *Flora of tropical Africa* relating to *M. thomsoni* was not founded on fact. Furthermore, there is no evidence on the sheet of *Scott Elliot 6960* at Kew that it had yellow flowers, whilst it seems almost certain that a duplicate of this gathering at Berlin, with the collector's number wrongly transcribed as "6060" was the holotype of *M. spathulata* C. B. Clarke.

Having disposed of the mythical character "corolla yellow," we now have to try to distinguish the first five species of *Mimulopsis* enumerated in the *Flora of tropical Africa*. Geography counts for nothing, as it is possible to match the Abyssinian *M. solmsii* with specimens from the Cameroons and from Nyasaland.

Shape, size, and indumentum of calyx, all very variable characters, seem quite uncorrelated, as do the degree of toothing of the leaf margin and the presence or absence of a cordate base to the blade. The largest variation seems to occur in East Africa. It may be significant that more than one reliable collector has obtained unwittingly a mixed gathering showing two distinct "forms." Humbert in his gathering 7441 from the mountains west of Lake Kivu has both *M. velutinella* Mildbr. and *M. violacea* var. *kivuensis* Mildbr. These species differ chiefly in the former's not having the glandular and long jointed hairs on the calyx lobes. The Kew specimen of this gathering is somewhat intermediate in this respect. Maitland under his 447 has collected near Kampala a similar mixture of forms, whilst Purseglove under his 723 has both the extreme forms and intermediates. Similar mixtures of forms have been collected in Kenya. The fact that these different forms occur within a population of similar-looking plants suggests most strongly that they represent but a single species. It is not, in my opinion, wise at the present state of our knowledge to give names to these variants, and I accordingly adopt the earliest specific name for the aggregate species without attempting to differentiate it further.

Dyschoriste verticillaris (Oliv.) C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. 5: 75. 1899.

Calophanes verticillaris T. Anders. ex Oliv. Trans. Linn. Soc. **29**: 126. 1875.
Dyschoriste decora S. Moore, Jour. Bot. **51**: 212. 1913.

Zomba District: Zomba Plateau, in *Brachystegia* woodlands, herb 40–60 cm. high, flower with reddish calyx and pale purple corolla, viscid, 1100 m., June 17, 1946, *16334*. Kota-kota District: Nchisi Mountain, occasional in *Brachystegia* woodland, perennial herb 70–100 cm. high, stems several, erect from a thick woody stock, flowers dark purple, 1400 m., July 24, 1946, *16889*. Kasungu District: Kasungu, local in *Brachystegia* woodlands, perennial herb 60–80 cm. high, stems several, erect from a thick woody stock, 1000 m., Aug. 25, 1946, *17416*. Cholo District: Cholo Mountain, common in *Brachystegia* woodland, shrub 1–1.5 m. high, stems several, erect, flower pale purple, 1200 m., Sept. 26, 1946, *17826*. Southern Tanganyika, south to Portuguese East Africa, and S. Rhodesia, and west to Katanga and N. Rhodesia.

Phaulopsis imbricata (Forsk.) Sweet, Hort. Brit. **1**: 327. 1827.

Ruellia imbricata Forsk. Fl. Aegypt.-Arab. 113. 1775.
Phaulopsis parviflora Willd. Sp. Pl. **3**: 342. 1801; C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. **5**: 83. 1899.

Zomba District: Zomba Plateau, common on moist roadsides in woodlands, perennial herb about 30–40 cm. high, branches ascending, several from a more or less fleshy stock, bracts green, viscid with glandular hairs, flowers white, 1450 m., June 5, 1946, *16253*. Kota-kota District: Nchisi Mountain, gregarious among rocks in *Brachystegia* woodland, perennial herb, 20–70 cm. high, bracts green, viscid, flowers white, 1400 m., July 26, 1946, *16950*. Cholo District: Cholo Mountain, frequent in rain-forest second growths, herb more or less 1 m. high, calyx and bracts viscid, flowers white, 1200 m., Sept. 19, 1946, *17644*. Widely spread through tropical Africa and Asia.

As treated in the *Flora of tropical Africa*, the species of *Phaulopsis* are highly unsatisfactory. The characters "strobilate," "hardly strobilate," and "not strobilate" are difficult to assess, so that the key is of little use for determining the first nine species. I agree with Clarke in considering his *P. longifolia* T. Thoms. (not Sims, and therefore an illegitimate name) a variant of *P. imbricata* (which Clarke calls *P. parviflora*). Time at present will not allow the dissection and examination of the large amount of material of these "species" now at Kew, so I prefer for the present to place all Mr. Brass' specimens under *P. imbricata* although *16950* has the anticous calyx-lobes slightly spathulate.

Blepharis (subg. *Blepharis* § *Scorpioideae*) sp.

Kota-kota District: Mpofu, in *Brachystegia* woodlands, 30–50 cm. high, flowers purple, 960 m., Aug. 1, 1946, *Vernay in Brass 17094.*

This specimen agrees well with a plant collected by Buchanan (no. 696) from an unspecified locality in Nyasaland in 1891 and named by C. B. Clarke as *Blepharis longifolia* Lindau. The type of *B. longifolia* was from Tanganyika and is not represented at Kew, but a specimen from Tanganyika also named by C. B. Clarke as *B. longifolia* is specifically different from the Nyasaland plant. Until the much needed revisional work is done, it is best to leave specimens of this section unnamed rather than to give them unreliable epithets.

Blepharis (subg. *Blepharis* § *Scorpioideae*) sp.

North Nyasa District: Nyika Plateau, common in grassland on edges of juniper forests, herb about 60 cm. high, flowers purplish-blue, 2250 m., Aug. 11, 1946, *17179.*

This plant is specifically distinct from *Brass 17094*, but it is equally difficult to place a satisfactory name upon it.

Asystasia gangetica (L.) T. Anders. in Thwaites, Enum. Pl. Zeyl. 235. 1860.

Justicia gangetica L. Cent. II. Pl. 3. 1756.

Asystasia coromandeliana Nees in Wall. Pl. As. Rar. **3**: 89. 1832.

Cholo District: Cholo Mountain, occasional in rain-forest regrowths, scrambling herb 2 m. high, flowers pinkish-white, lower lip blotched with violet, 1200 m., Sept. 21, 1946, *17709*. Widely spread through tropical Asia and Africa.

Barleria spinulosa Klotzsch in Peters, Reise Mossamb. Bot. 208. 1861.

Blantyre District: Blantyre, in *Brachystegia* woodlands, shrub about 1 m. high, enlarged fruiting calyx conspicuously veined with brown, 1100 m., June 17, 1946, *16352*; ibid., in *Brachystegia* woodland, shrub about 2 m. high, enlarged fruiting calyx purplish, veined with brown, flower violet, 1100 m., June 18, 1946, *16357*. Cholo District: Nswadzi River, in riverine rain-forest undergrowth, shrub 40–50 cm. high, fruiting calyx brown, flowers purple, 840 m., Sept. 29, 1946, *17868*. Nyasaland and N. Rhodesia.

Barleria (§ *Prionitis*) sp.

Chikwawa District: Chikwawa, common in dry bushy forest of high river-banks, subshrub to 1 m. high, flowers orange-yellow, 200 m., Oct. 3, 1946, *17920*. Endemic in Nyasaland.

This plant represents what is almost certainly an undescribed species. It agrees well with the two Nyasaland specimens cited under *B. eranthemoides* R. Br. in the *Flora of tropical Africa* (**5**: 147. 1900). It differs from *B. eranthemoides* in having a two-lipped corolla. Out of the three gatherings I have examined there are only two imperfectly preserved corollas, so that their examination and reconstruction is difficult. It seems, however, that there is a marked bend at the apex of the corolla-tube, a character which is unusual in *Barleria*. The description of this species should await further gatherings in the flowering state, so that the presence of this character may be confirmed.

Pseuderanthemum subviscosum (C. B. Clarke) Stapf, Bot. Mag. **135**: *pl. 8244*. 1909; Milne-Redhead, Kew Bull. **1936**: 263. 1936.

Eranthemum subviscosum C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. **5**: 173. 1899.

Cholo District: Cholo Mountain, uncommon in rain-forest undergrowth, herb about 1 m. high, flowers pale purplish-pink, dimorphous, 1200 m., Sept. 21, 1946, *17710*; ibid., common in semi-shade in rain-forest, erect herb 0.5–1.5 m. high, simple or sparsely branched, flowers pale pink, 1200 m., Sept. 22, 1946, *17739*; ibid., very abundant in rain-forest undergrowth, shrub 1–1.5 m. high, seldom flowering at this season, flowers pale pinkish-purple, 1300 m., Sept. 26, 1946, *17819*. Nswadzi River, gregarious on shady river-banks, attractive shrub 1.5 m. high, flowers pale purple, 850 m., Sept. 27, 1946, *17845*. Nyasaland, Portuguese East Africa, and eastern S. Rhodesia.

With reference to *17710*, Mr. Brass mentions that the flowers are dimorphic. This is due to the cleistogamy of certain flowers in the inflorescence, a character which is well known to occur in other species of *Pseuderanthemum*, but which has not hitherto been recorded for *P. subviscosum*.

Brachystephanus africanus S. Moore, Trans. Linn. Soc. II. Bot. **4**: 31. 1894.

Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional in undergrowth of primary forest, herb about 1 m. high, bracts pink, corolla purple, 1890 m., July 12, 1946, *16809*. Uganda, Tanganyika, and Nyasaland, and possibly the Belgian Congo.

B. africanus was based on a plant collected by Alexander Whyte on Mlanje Mountain in 1891, which specimen has until now remained the only record of the species from Nyasaland. Mr. Brass' gathering is therefore of particular interest as it comes from the *locus classicus* of the species.

Justicia glabra Koenig ex Roxb. Fl. Ind. **1**: 132. 1820.

Rhaphidospora glabra (Roxb.) Nees in Wall. Pl. As. Rar. **3**: 115. 1832.

Chikwawa District: Lower Mwanza River, dry brushy forest, herb about 1 m. high, flowers yellow mottled with purple, 180 m., Oct. 4, 1946, *17944**. Eritrea to Portuguese East Africa and Nyasaland; also in India.

I follow C. B. Clarke in retaining this species in *Justicia*, for I consider his definitions of genera to be on the whole more sound than those of Lindau. Although sometimes the plant is glabrous, as its name suggests, there are forms with varying amounts of shaggy hairs on the stems, especially near the nodes. Mr. Brass' gathering is particularly hairy, the lower part of the stem being densely clothed with long spreading hairs.

Justicia nyassana Lindau, Bot. Jahrb. **20**: 66. 1894.

Kota-kota District: Nchisi Mountain, plentiful in rain-forest borders, herb 60–80 cm. high, corolla pink, calyx and bracts reddish, 1500 m., July 28, 1946, *16998*. Cholo District: Cholo Mountain, very abundant in second-growth rainforest, herb 50–100 cm. high, habit ascending, flowers white with the lower lip marked with pink, 1200 m., Sept. 21, 1946, *17703*. Tanganyika Territory and N. Rhodesia.

Justicia mollugo C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. **5**: 200. 1900.

Zomba District: Zomba Plateau, plentiful in open shady places about habitations, herb 8–15 cm. high, flower purple, the lower lip marked with darker purple, 1430 m., May 30, 1946, *16088*. Kota-kota District: Nchisi Mountain, plentiful in shallow seepage-wet soil in *Brachystegia* woodland, herb 10–15 cm. high, flower rose-pink, 1400 m., July 24, 1946, *16913*. Nyasaland and N. Rhodesia.

These two gatherings of *J. mollogo* confirm Clarke's statement that the species does not bear abnormal capsules. *J. mollugo* is an endemic annual which has become a weed in disturbed ground where it enjoys the lack of competition afforded by man's activities.

Justicia striata (Klotzsch) Bullock, Kew Bull. **1932**: 502. 1932.

Adhatoda striata Klotzsch in Peters, Reise Mossamb. Bot. 216. 1861.

Justicia melampyrum S. Moore, Trans. Linn. Soc. II. Bot. **4**: 32. 1894.

Kota-kota District: Benga, west shore of Lake Nyasa, on sandy beach, herb 50 cm. high, ascending, leaves few, flowers white, the lower lip marked with purple, 470 m., Sept. 2, 1946, *17491*. Cholo District: Cholo Mountain, frequent in young rain-forest regrowths, ascending herb about 50 cm. high, flowers white, the lower lip marked with purple, 120 m., Sept. 25, 1946, *17808*. Widely spread in eastern and southern tropical Africa.

Isoglossa milanjiensis S. Moore, Trans. Linn. Soc. II. Bot. **4**: 33. 1894.

Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional in rain-forest second growths, herb 1–2 m. high, branches numerous, weak, corolla lobes white, tube and filaments red, 1800 m., June 25, 1946, *16422*. Endemic on Mlanje Mountain.

This species is known hitherto only from the type gathering. Mr. Brass' specimen does not agree exactly with Whyte's, the bracts being somewhat narrower and the bracts, bracteoles, and calyx-lobes less conspicuously ciliate.

Isoglossa strigulosa C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. **5**: 231. 1900.

North Nyasa District: Nyika Plateau, in montane forest undergrowth, herb 1–1.5 m. high, flowers white flecked with purple, fruit on 3 specimens only, 2340 m., Aug. 19, 1946, *17341*. Endemic in Nyasaland.

Here again the species is known hitherto only from the type gathering, which was made by Whyte on the Masuku Plateau in July 1896, just 50 years earlier.

Rhinacanthus gracilis Klotzsch in Peters, Reise Mossamb. Bot. 218, 1861.

Pseuderanthemum dichotomum Lindau, Bot. Jahrb. **22**: 40. 1894.

Rhinacanthus communis sensu C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. **5**: 224. 1900, pro parte, excl. spec. ex Afr. occ.; non *R. communis* Nees.

Kota-kota District: Nchisi Mountain, gregarious in a moist forest ravine, herb 30–50 cm. high, ascending, leaves very dark green, flowers pinkish-white, lower lip spotted with mauve, 1550 m., July 30, 1946, *17036*. Chikwawa District: Chikwawa, scattered on creek flats in dry woodland, perennial herb 30–50 cm. high, flowers yellowish-white, 300 m., Oct. 5, 1946, *17979*. Widely spread in southern Africa; also in Tanganyika Territory and southeastern Kenya.

R. gracilis Klotzsch has long been confused both with the Indian species, *R. nasutus* (L.) Kurz, commonly known as *R. communis* Nees, and with the West and Equatorial African species hitherto known both as *R. communis* and as *R. dewevrei* De Wild. & Th. Dur.

As here recognized, *R. gracilis* is a variable species in many respects. The leaves may be cuneate or rounded at the base, the corolla-tube straight or faintly S-shaped, the corolla white or cream, unmarked or finely speckled with pinkish mauve; the capsule and seeds vary in size. It may eventually be possible to separate out certain subspecific taxa, but a good deal more material and information will have to be available before this is possible. At the northern end of its range, *R. gracilis* is restricted to the coastal district and here seems to be considerably less plastic. The leafless terminal panicle serves to distinguish *R. gracilis* from its allies.

Anisotes formosissimus (Klotzsch) Milne-Redhead, comb. nov.

Adhatoda formosissima Klotzsch in Peters, Reise Mossamb. Bot. 215. 1861.

Symplectochilus formosissimus (Klotzsch) Lindau, Bot. Jahrb. **20**: 45. 1894.

Macrorungia formosissima (Klotzsch) C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. **5**: 255. 1900.

Chikwawa District: Chikwawa, abundant in dry bushy forest of elevated river plain, shrub about 1 m. high, stem glaucous, 200 m., Oct. 2, 1946, *17905**. Portuguese East Africa and S. Rhodesia.

The six gatherings of this plant in the Kew Herbarium are all in flower. C. B. Clarke had not seen the fruit, and consequently he placed it, with doubt, in *Macrorungia*. The present gathering, which is in fruit, shows that it is a species of *Anisotes*. The capsule is 30 mm. long with a stout stipe 4.5 mm. broad, and normally contains 4 seeds. The placentae do not rise elastically on dehiscence.

Anisotes sessiliflorus (Benth.) C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. **5**: 226. 1900, pro parte, quoad spec. leg. Meller.

Himantochilus sessiliflorus Benth. in Benth. & Hook. Gen. Pl. **2**: 1117. 1876.

Chikwawa District: Chikwawa, in dry bushy forest of high river-banks, shrub 4 m. high, deciduous, now almost leafless, flowers red, 200 m., Oct. 3, 1946, *17919*. Nyasaland and possibly Tanganyika Territory.

This gathering is from the type locality. Until now the species had not been again collected in Nyasaland since C. J. Meller found it in 1861. Two poor specimens from Tanganyika have doubtfully been referred to the species. The fruits are still unknown.

Hypoëstes verticillaris (L.f.) R. Br. Prodr. Fl. Nov. Holl. **1**: 474. 1810.

Justicia verticillaris L. f. Suppl. Plant. 85. 1781.
Hypoëstes mlanjensis C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. **5**: 250. 1900.

Zomba District: Zomba Plateau, frequent among grass on a rocky slope, perennial herb, branches several, ascending, corolla white, the upper lip marked with purple at the base, 1430 m., May 29, 1946, *16079*. Kota-kota District: Nchisi Mountain, frequent in *Brachystegia* woodland, herb 60–100 cm. high, flowers white, lower lip blotched with purple, 1400 m., July 24, 1946, *16891*; ibid., plentiful in shrubberies bordering rain-forest, herb about 1 m. high, flowers cream-coloured, upper lip mottled with purple, 1650 m., July 31, 1946, *17066*. North Nyasa District: Nyika Plateau, common in juniper forest undergrowth, herb 50–60 cm. high, generally sterile, flowers white blotched with purple, 2250 m., Aug. 11, 1946, *17158**. Chintembwe, frequent on rocky grasslands, perennial herb, flowers white marked purple, 1400 m., Sept. 9, 1946, *17584*. Widely spread in Africa from Senegal to Abyssinia and the Cape Province of South Africa; also in Arabia.

This is a very polymorphic species, which has defied all my attempts to split it up into satisfactory subdivisions. It varies in the kind and degree of indumentum on the leaves, stems and inflorescence, in the shape of the leaves, in the length of the bracteoles, in the degree of fusion of the bracteoles and of the calyx-segments, in the degree of congestion or elongation of the inflorescence, as well as in the habit. *Brass 17584* shows a precocious condition, when the plant comes rapidly into flower after the grass and dead shoots have been burnt off. These flowering shoots are only about 7 cm. long and have little or no leaf development. It is probable that these plants would produce normal leafy flowering shoots later in the season, but this has yet to be proved by observation and experiment.

Hypoëstes aristata (Vahl) R. Br. Prodr. Fl. Nov. Holl. **1**: 474. 1810.

Justicia aristata Vahl, Symb. Bot. **2**: 2. 1791.
Hypoëstes insularis T. Anders. Jour. Linn. Soc. Bot. **7**: 49. 1864.
Hypoëstes antennifera S. Moore, Jour. Bot. **18**: 41. 1880.
Hypoëstes staudtii Lindau, Bot. Jahrb. **22**: 122. 1895.

Kota-kota District: Nchisi Mountain, plentiful in shrubberies bordering lower montane forest, shrub 1–1.5 m. high, flowers pale purple, 1600 m., July 26, 1946, *16958*. Cameroons and Fernando Po, east to Abyssinia and south to Cape Province, South Africa.

I find myself unable to retain, as species distinct from *H. aristata*, the three species which follow it in Clarke's account of the genus (Fl. Trop. Afr. **5**: 245-246. 1899), and their names are here placed in synonymy. The only character which Clarke was able to use to distinguish *H. antennifera* and *H. insularis* from *H. aristata* is that of the size of the leaf. This is a character difficult to use, for comparison must be made between leaves from corresponding positions on the shoot, and from plants grown under similar climatic and edaphic conditions. Many flowering specimens have by that time lost their primary leaves. Whilst considerable variation in leaf-size undoubtedly does occur, it is not as marked as one might think from a casual glance through the material; it is certainly, in my opinion, not of sufficient importance to justify specific separation. The inflorescence character on which Clarke distinguishes *H. staudtii* is not fundamental, being only one of degree, and I agree with Hutchinson and Dalziel (Fl. W. Trop. Afr. **2**: 268. 1931) in considering this species conspecific with *H. insularis*.

Hypoëstes triflora (Forsk.) Roem. & Schult. Syst. Veg. **1**: 141. 1817.

Justicia triflora Forsk. Fl. Aegypt.-Arab. 4. 1775.
Hypoëstes phaylopsoides S. Moore, Trans. Linn. Soc. II. Bot. **4**: 34. May 1894.
Hypoëstes kilimandscharica Lindau, Bot. Jahrb. **19** (Beibl. 47): 47. Aug. 1894.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common in moist forest openings, scrambling to height of 1 m. or more, flowers white streaked with purple, 1820 m., July 1, 1946, *16585*; ibid., open bank of a stream in forest, herb 30-50 cm. high, ascending, flowers white streaked with purple, 1750 m., July 5, 1946, *16663*. Abyssinia to Natal and Angola, Cameroons and Fernando Po, Arabia, India, and China.

Again I am forced to take a broad view of a species of *Hypoëstes. H. triflora* was originally described from Arabia. Its range is now known to extend south to Natal, west to the Cameroon Mt. and east to China. It is a species of forests, showing great variability as do the other two widely spread species here enumerated. Mr. Brass' two gatherings show different forms of the species. The size, shape and arrangement of the bracts and bracteoles are characters which vary considerably without any noticeable correlation, and I find many intermediates between typical *H. triflora* and the extreme form recognized by C. B. Clarke as a distinct species, *H. phaylopsoides* S. Moore, which was based on a specimen collected on Mt. Mlanje by Mr. Alexander Whyte in 1891.

Dicliptera mossambicensis Klotzsch in Peters, Reise Mossamb. Bot. 220. 1801.

Chikwawa District: Lower Mwanza River, plentiful in dry brushy forest, very pubescent herb, flowers pink, 180 m., Oct. 4, 1946, *17945*. Southern Tanganyika Territory, Portuguese East Africa, and new to Nyasaland.

Dicliptera pumila (Lindau) Dandy, comb. nov. [J.E.D.]

Duvernoia pumila Lindau, Bot. Jahrb. **20**: 44. 1894.
Peristrophe usta C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. **5**: 244. 1900.
Peristrophe pumila (Lindau) Lindau in R. E. Fr. Wiss. Ergebn. Schwed. Rhod.-Kongo-Exp. 1911-12 **1**: 307. 1916.

Kota-kota District: Chintembwe, common on rocky grasslands, perennial herb 4-15 cm. high, flowers lavender mottled with purple, 1400 m., Sept. 9, 1946, *17582*. Widely spread from southern Anglo-Egyptian Sudan to S. Rhodesia.

This species shows great variation, and is as yet imperfectly known. It flowers early in the season, often before the rains, and at this time it is more or less leafless. Mature leaves and ripe fruits were unknown to Lindau, and are still unrepresented in the Kew Herbarium. Ripe fruit has, however, been collected in the Anglo-Egyptian Sudan by Hope Simpson, and this, having elastically rising placentae, confirms the suspicion, which I have held for long, that the species is a *Dicliptera*. I am indebted to my friend, J. E. Dandy, for calling my attention to Hope Simpson's gathering. Since I wrote the above, an excellent gathering in fruit has been made by A. A. Bullock.

Dicliptera sp.

North Nyasa District: Nyika Plateau, abundant in juniper forest undergrowth, herb about 1 m. high, flowers rose-purple, 2250 m., Aug. 11, 1946, *17161*.

This plant is placed in *Dicliptera* by inference in the absence of ripe capsules. It appears similar to *D. lingulata* C. B. Clarke in its habit, but differs from that species in the shape of the bracts and bracteoles. Incidentally *D. lingulata* is also from the Nyika Plateau, where it was collected by Alexander Whyte in 1896 and has never been recollected.

Dicliptera sp.

Cholo District: Cholo Mountain, occasional in rain-forest undergrowth, flowers pale pink blotched with dark pink, 1350 m., Sept. 26, 1946, *17817*.

This plant does not match any of the named or unnamed specimens of *Dicliptera* at Kew. As the available material is not particularly good, with only two flowers and without fruits, I prefer to leave it without a name until it is possible to revise the genus.

Peristrophe bicalyculata (Retz.) Nees in Wall. Pl. As. Rar. **3**: 113. 1832.

Dianthera bicalyculata Retz. Sv. Vet.-Akad. Handl. **36**: 297. 1775.

Kota-kota District: Chia area, on grassy flood-banks of woodland streams, shrub 1 m. high, several weak almost leafless stems produced from a common rootstock, flowers pink marked with purple, fragrant, 480 m., Sept. 3, 1946, *17508*. Widely spread through tropical Africa and Asia; new to Nyasaland.

SELAGINACEAE

Hebenstretia dentata L. Sp. Pl. 629. 1753; Rolfe in Thiselton-Dyer, Fl. Trop. Afr. **5**: 265. 1900.

Mlanje District: Mlanje Mountain; Chambe Plateau, occasional in grassland, shrub 30–100 cm. high, corolla cream with an orange-red spot at base of lower lobe, 2000 m., July 9, 1946, *16761*; Luchenya Plateau, common very locally among rocks in grasslands, shrub about 1 m. high, flowers white with an orange blotch on upper lip, 2200 m., July 11, 1946, *16788*. Kota-kota District: Nchisi Mountain, common among rocks in *Brachystegia* woodland, shrub 60–80 cm. high, flowers white with orange patch on lip, 1600 m., July 26, 1946, *16963*. North Nyasa District: Nyika Plateau, plentiful on shrubby edges of forest, shrub 80–100 cm. high, stems one or several, erect from a thick stock, flowers white with orange patch at base of lip, 2340 m., Aug. 12, 1946, *17187*. Widespread in eastern tropical Africa from the Anglo-Egyptian Sudan southwards to Angola and South Africa.

Selago L. Rolfe's account of *Selago* in the *Flora of tropical Africa* is unsatisfactory, to put it mildly, and an honest attempt to use his key is liable to lead to nothing but bewilderment and exasperation. The reckless creation there of new species is really almost worthy of Gandoger. I found it impossible to use this uninspired work in naming the specimens collected by Mr. Brass, and that the only thing to do was to revise altogether the tropical African species; the following account is an endeavour to replace chaos by order.

In the *Flora of tropical Africa* Rolfe made a primary division of *Selago* on whether the calyx is 5-lobed or only 2–3-lobed. In the *Flora capensis* Rolfe separated the latter group from *Selago* as a distinct genus *Walafrida* E. Mey. There is no question that the two groups based on the calyx are valid, and that this provides an easily observed way of separating them. It is a matter of opinion whether one should follow E. Meyer, Choisy, Bentham and Hooker, Wettstein, and Rolfe's early view in treating these groups as sections, or accept Rolfe's later view, also that of Phillips, that they are genera; especially because, beyond the calyx, there is no difference in facies. However, the morphology of the calyx seems of such taxonomic importance in this family that I prefer to maintain *Selago* and *Walafrida* as distinct genera.

In a solitary specimen of an obvious *Walafrida*—*H. Wild 1375* (Govt. Herb. 15912) from S. Rhodesia—nearly all the calyces are normally 3-lobed, and a very occasional one may show an abnormally bifid lateral lobe. Such a casual abnormality cannot be held to invalidate the genus.

Calyx 5-lobed (*Selago* L. sensu stricto).

Inflorescence corymbose or shortly rounded-capitate (*S. thomsoni*).

Cauline leaves mostly (1.5–) 2–5 mm. wide, narrowly lanceolate to linear-lanceolate. 1a. *S. thomsoni* var. *caerulea*.

Cauline leaves mostly 1–1.5 mm. wide, broadly linear, median and upper ones mostly rather short, 4–8 mm. long (often longer in Nyasaland; forms from Tanganyika and Kenya with narrow leaves about 1 mm. wide may be separated from var. *whyteana* by their short leaves). 1b. *S. thomsoni* var. *thomsoni*.

Cauline leaves 0.25–1 mm. wide, filiform to narrowly linear, median and upper ones mostly rather long, 8 mm. long or more. 1c. *S. thomsoni* var. *whyteana*.

Inflorescence an elongate ± pyramidal panicle, dense, or lax and composed of usually ± pedunculate heads or short spikes.

Leaves glabrous, linear; panicle normally dense; corolla-tube 1.5–3 mm. long; calyx-teeth linear-oblong, usually densely ciliate (*S. thyrsoidea*).

Leaves of main stem mostly 1–1.6 cm. long; stems without numerous short lateral leafy branches; largest corolla-lobe about 3 mm. long. 2a. *S. thyrsoidea* var. *thyrsoidea*.

Leaves of main stem mostly 1.2–2 cm. long; stems with numerous short lateral leafy branches; largest corolla-lobe about 2 mm. long. 2b. *S. thyrsoidea* var. *austrorhodesica*.

Leaves of main stem mostly 0.6–1.2 cm. long; stems subsimple or with numerous short leafy branches; largest corolla-lobe 1–2 mm. long. 2c. *S. thyrsoidea* var. *nyikensis*.

Leaves pubescent or puberulous, narrowly lanceolate to oblong-linear, sometimes linear; panicle normally lax; corolla-tube 3–4 mm. long; calyx-teeth triangular-acute or acuminate, less densely ciliate (*S. welwitschii*).

Stems and leaves sparsely to ± densely clothed with minute decurved appressed hairs. 3a. *S. welwitschii* var. *welwitschii*.

Stems and leaves ± densely clothed with longer patent flexuous or straight hairs. 3b. *S. welwitschii* var. *holubii*.

Calyx (2–) 3-lobed (*Walafrida* E. Mey. sensu Rolfe).

Inflorescence corymbose or rounded, aggregated near the ends of the stem and main branches.

Leaves filiform to narrowly linear, 0.3–0.8 mm. wide (*W. swynnertonii*).

Leaves densely scabrid-pubescent. 4a. *W. swynnertonii* var. *swynnertonii*.

Leaves glabrous or very sparsely pubescent. 4b. *W. swynnertonii* var. *leiophylla*.

Leaves broadly linear to oblanceolate, 1–5 mm. wide.

Leaves usually without axillary fascicles of smaller leaves near the inflorescence, sometimes with fascicles much smaller than the cauline leaves which mostly exceed 2 cm. in length; fruits distinctly muriculate; corolla-tube 1.7–2 mm. long, longest corolla-lobe 1.4–1.6 mm. long. 5. *W. angolensis*.

Leaves on main stems all or almost all with axillary fascicles of leaves which are conspicuous and often not much smaller than the cauline leaves themselves which are very rarely as long as

2 cm. fruits smooth or roughened; corolla-tube 2.5–5 mm. long, longest corolla-lobe 2–3 mm. long (*W. goetzei*).

Stems and main inflorescence-branches clothed with lax very flexuous ± deflexed hairs normally equalling or exceeding the diameter of the inflorescence-branches; fruits distinctly muriculate (? always). 6. *W. goetzei* var. *goetzei*.

Stems and main inflorescence-branches clothed with longer dense patent hairs straight or nearly so and equalling or exceeding the diameter of the inflorescence-branches. 6. *W. goetzei* var. *pubescentior*.

Stems and main inflorescence-branches very shortly crisped-pubescent, the hairs shorter than the diameter of the inflorescence-branches; fruits smooth or slightly roughened (? always). 6. *W. goetzei* var. *brevipila*.

Inflorescence a lax sometimes one-sided ± elongate pyramidal panicle of heads or spikes often extending to near the base of the stems.

Corolla-tube 2.5 mm. long, longest lobe about 1 mm. long; lateral calyx-lobes elliptic-oblong, dorsal lobe linear-oblong, obtuse; leaves on main stem mostly 1–2 cm. long. 7. *W. schinzii*.

Corolla-tube 1–1.25 (–1.5) mm. long, longest lobe about 0.5–0.8 mm. long; lateral calyx-lobes narrowly oblong, dorsal lobe filiform-acute or absent; leaves on main stem often (not always) less than 1 cm. long. 8. *W. paniculata*.

Inflorescence a dense narrow elongate spike-like panicle, often somewhat interrupted at base; stems densely grey-puberulous; leaves linear, glabrous or sparsely puberulous, fasciculate. 9. *W. alopecuroides*.

Selago L. emend. Rolfe.

Selago sect. *Genuinae* E. Mey. Comm. Pl. Afr. Austr. 254. 1837.

Selago sect. *Euselago* Endl. Gen. 641. 1839; Choisy in DC. Prodr. **12**: 8. 1848; Wettst. in Engl. & Prantl, Nat. Pflanzenf. **4^{3b}**: 82. 1891.

Calyx 5-lobed.

1a. Selago thomsoni Rolfe var. **caerulea** (Rolfe) Brenan, comb. nov.

Selago caerulea Rolfe in Thiselton-Dyer, Fl. Trop. Afr. **5**: 267. 1900.
Selago viscosa Rolfe in Thiselton-Dyer, Fl. Trop. Afr. **5**: 267. 1900.
Selago tenuicaulis Rolfe in Thiselton-Dyer, Fl. Trop. Afr. **5**: 268. 1900.
Selago melleri Rolfe in Thiselton-Dyer, Fl. Trop. Afr. **5**: 268. 1900.
Selago blantyrensis Rolfe in Thiselton-Dyer, Fl. Trop. Afr. **5**: 268. 1900.
Selago mcclouniei Rolfe, Kew Bull. **1908**: 262. 1908.

Folia caulina plerumque (1.5–) 2–5 mm. lata, anguste lanceolata usque lineari-lanceolata.

North Nyasa District: Nyika Plateau, Nchena-chena Spur, occasional in shrubberies on grassland, shrub 1–1.5 m. tall, erect, sparingly branched, aromatic, flowers lilac, 1700 m., Aug. 10, 1946, *17149*. Nyika Plateau, grassland bordering montane forest, not common, shrub 60 cm. high, flowers lavender, 2350 m., Aug. 17, 1946, *17279*.

S. thomsoni var. *caerulea*, as interpreted here, is found only in Nyasaland and southwestern Tanganyika Territory. The type of var. *caerulea* is the same as that of *S. caerulea* Rolfe: *Whyte 145* from the Nyika Plateau.

I am unable to see satisfactory differences between any of the six species here amalgamated. The "viscous-pubescent" stems and leaves of *S. viscosa* Rolfe appear to be caused by nothing more than good old herbarium glue, perhaps still tacky when Rolfe described his *S. viscosa*. Thus finely have the specific limits been drawn in *Selago*.

1b. Selago thomsoni Rolfe var. **thomsoni**.

Selago thomsoni Rolfe in Oliv. Jour. Linn. Soc. Bot. **21**: 402. 1885, sensu stricto.
Selago johnstoni Rolfe, Trans. Linn. Soc. II. Bot. **2**: 344. 1887.
Selago holstii Rolfe in Thiselton-Dyer, Fl. Trop. Afr. **5**: 269. 1900.
Selago buchananii Rolfe in Thiselton-Dyer, Fl. Trop. Afr. **5**: 269. 1900.

Folia caulina plerumque 1–1.5 mm. lata, late linearia, mediana et superiora breviuscula, plerumque 4–8 mm. longa [saepe longiora in speciminibus nyasensibus; formae angustifoliae (circ. 1 mm.) tanganyikenses et kenienses a var. *whyteana* foliis brevioribus distinguendae].

Zomba District: Zomba Plateau, on an exposed rock in open grasslands, woody herb, branches weak, ascending from a thick woody stock, leaves more or less fleshy, flowers purple, 1750 m., May 31, 1946, *16116*. North Nyasa District: Nyika Plateau, abundant on disturbed ground in grasslands, herb 20 cm. high, branches radiating and ascending, flowers pale purple, 2400 m., Aug. 18, 1946, *17315*.

S. thomsoni var. *thomsoni* has the widest area of any of the three varieties recognised here, being found in Kenya, Tanganyika, and Nyasaland. Kenya is also the most northerly extension of the genus.

The var. *thomsoni* grades into var. *caerulea* in one direction and into var. *whyteana* in the other, so that the varieties are not very clear-cut. In northern Tanganyika Territory and Kenya particularly, narrow-leaved forms of var. *thomsoni* occur with leaves about 1 mm. wide; these may be separated from var. *whyteana* by their shortness of their leaves. In Nyasaland the upper and median cauline leaves of var. *thomsoni* tend to be longer than further north, but the narrow-leaved forms seem absent.

1c. Selago thomsoni Rolfe var. **whyteana** (Rolfe) Brenan, comb. nov.
Selago whyteana Rolfe, Trans. Linn. Soc. II. Bot. **4**: 35. 1894.
Selago milanjiensis Rolfe, Trans. Linn. Soc. II. Bot. **4**: 35. 1894.

Folia caulina 0.25–1 mm. lata, filiformia usque anguste linearia, mediana et superiora plerumque longiuscula, ultra 8 mm. longa.

Mlanje District: Likubula Gorge, frequent in woodlands, shrub about 50 cm. to 1.5 m. high, flowers purple, about 1200 m., June 21, 1946, *Vernay 16390*. Mlanje Mountain; Luchenya Plateau, frequent in open grasslands, attractive bushy shrub 30–50 cm. high, flowers pink, 1860 m., June 26, 1946, *16444*; ibid., one example in grassland, shrub 30 cm. high, flowers white, 1890 m., July 12, 1946, *16807**.

This variety is apparently restricted to the region of Mlanje Mountain. *Vernay 16390* is an extreme with remarkably filiform leaves, perhaps due to its habitat. The type-specimen of *Selago milanjiensis* has been mislaid, and is the only one that I have not seen and dissected. I have therefore referred it here from description only.

The floral characters of all the species that I have referred to *S. thomsoni* in a wide sense are remarkably constant, within narrow limits. The calyx varies in length from 1–2 mm., usually about 1.5 mm.; the corolla-tube is (1.3–) 1.5–2 mm. (rarely to 2.5 mm.), and the longest corolla-lobe varies from 1.3–2 mm. long.

Among the South African species the nearest relative to *S. thomsoni* is perhaps *S. nelsoni* Rolfe.

[**2a. Selago thyrsoidea** Bak. var. **thyrsoidea.**
Selago thyrsoidea Bak. Kew Bull. **1898**: 159. 1898.

Caules vel rami laterales primarii subsimplices sine ramulis numerosis lateralibus brevibus foliatis. Nodi conferti, 2–3 mm. inter se distantes. Folia dense disposita, plerumque circiter 1–1.6 cm. longa. Calyx plerumque ultra medium divisus. Lobus maximus corollae circiter 3 mm. longus.

Nyasaland only (Nyika Plateau, *Whyte 144*, type of the species; Panda Peak, 1830 m., Sept. 1902, *McClounie 189*).]

[2b. **Selago thyrsoidea** Bak. var. **austrorhodesica** Brenan, var. nov.

Caules ramulos numerosos laterales breves foliatos ex axillis emittentes. Nodi minus conferti, 3–5 mm. inter se distantes. Folia caulina plerumque circiter 1.2–2 cm. longa. Calyx usque ad vel ultra medium divisus. Lobus maximus corollae circiter 2 mm. longus.

S. RHODESIA: Inyanga District: Troutbeck, all over the veld, a very common herb, mauve flowers, 2130 m., Mar. 21, 1948, *J. M. Rattray 1405* (Govt. Herb. No. 20641) (TYPUS varietatis in Herb. Kew.). The Downs, Jan. 13, 1944, *C. P. Piers* in Govt. Herb. No. 11658 (Herb. Kew.).]

[2c. **Selago thyrsoidea** Bak. var. **nyikensis** (Rolfe) Brenan, comb. nov.

Selago nyasae Rolfe in Thiselton-Dyer, Fl. Trop. Afr. **5**: 270. 1900.
Selago nyikensis Rolfe, Kew Bull. **1908**: 261. 1908.

Caules vel rami laterales primarii aut subsimplices aut ramulos numerosos laterales breves foliatos emittentes. Folia caulina plerumque 0.6–1.2 cm. longa. Calyx usque ad medium vel ultra divisus. Lobus maximus corollae 1–2 mm. longus.

Tanganyika Territory, Portuguese East Africa, and Nyasaland. I have adopted the epithet *nyikensis* rather than *nyasae* as the cotypes of the latter are both scrappy, but *nyikensis* may be no more than an ecad of var. *thyrsoidea.*

S. thyrsoidea in its wide sense is very easily distinguished from *S. thomsoni* by its paniculate not corymbose inflorescence, coupled with linear glabrous leaves. The calyx-teeth of *S. thyrsoidea* are usually more densely ciliate than in *S. thomsoni*, and very often more deeply divided; in addition the bracteoles are often longer.

S. thyrsoidea is apparently related to the S. African *S. schlechteri* Rolfe, which may possibly prove synonymous, but with short straight or slightly curved not crisped puberulence and much more ample panicles; also perhaps to *S. meyeri* Choisy (*S. ramulosa* E. Mey., non Link), but with more ciliate calyx-lobes.]

[3a. **Selago welwitschii** Rolfe var. **welwitschii.**

Selago welwitschii Rolfe, Jour. Bot. **24**: 175. 1886, sensu stricto.
Selago hoepfneri Rolfe in Thiselton-Dyer, Fl. Trop. Afr. **5**: 271. 1900, sensu stricto, quoad *Hoepfner 42*, lectotypus speciei.
Selago holubii sensu Rolfe in Thiselton-Dyer, Fl. Trop. Afr. **5**: 271. 1900, pro parte, quoad *McCabe 28*; non *S. holubii* Rolfe.

Caules et folia pilis minutis decurvis appressis sparse usque plus minusve dense vestiti.

S. Rhodesia, Angola, Bechuanaland Protectorate, and South Africa.]

[3b. **Selago welwitschii** Rolfe var. **holubii** (Rolfe) Brenan, comb. nov.

Selago holubii Rolfe in Thiselton-Dyer, Fl. Trop. Afr. **5**: 271. 1900, sensu stricto, excl. *McCabe 28.*
Selago hoepfneri sensu Rolfe in Thiselton-Dyer, Fl. Trop. Afr. **5**: 271. 1900, excl. *Hoepfner 42*; non *S. hoepfneri* Rolfe.

Caules et saepius etiam folia pilis longis patentibus rectis vel flexuosis plus minusve dense vestiti.

S. Rhodesia, Angola, Bechuanaland Protectorate, Southwest Africa, and ? the Transvaal. The various numbers collected by Holub on which *Selago holubii* was based are all rather uniform, and all little bits. I choose *Holub 1090* as the lectotype.

Schinz s.n. (Omulonga) and *Schinz 8*, both cited by Rolfe in the *Flora of tropical Africa* under *S. hoepfneri*, are in my opinion var. *holubii*, but they are shorter-haired than usual and somewhat intermediate between var. *holubii* and var. *welwitschii.*

S. welwitschii as defined here is a most distinct species in its usually ample lax inflorescence built up of small dense heads or spikes, and also in its hairy leaves, often rather broad.]

Walafrida E. Mey. sensu Rolfe.

Selago sect. *Macria* E. Mey. Comm. Pl. Afr. Austr. 268. 1837; Choisy in DC. Prodr. **12**: 18. 1848; Wettst. in Engl. & Prantl, Nat. Pflanzenf. **4^{3b}**: 82. 1891.
Walafrida E. Mey. sensu Rolfe in Thiselton-Dyer, Fl. Cap. **5^{1}**: 116. 1901.

Calyx (2–) 3-lobed.

[**4a. Walafrida swynnertonii** S. Moore var. **swynnertonii.**

Walafrida swynnertonii S. Moore, Jour. Linn. Soc. Bot. **40**: 165. 1911, sensu stricto.
Selago swynnertonii (S. Moore) Eyles, Trans. Roy. Soc. S. Afr. **5**: 473. 1916.

Folia dense scabrido-pubescentia.

S. Rhodesia only [*Swynnerton 2135*, *Teague 47*, *Chase 1293* (Govt. Herb. No. 24075)].]

[**4b. Walafrida swynnertonii** S. Moore var. **leiophylla** Brenan, var. nov.

Folia glabra vel valde sparse pubescentia.

PORTUGUESE EAST AFRICA: Manica e Sofala Province, Moribane District: Chimanimani Mountains, Moribane, 60 cm. high, flowers pale mauve, 1220 m., Mar. 2, 1907, *W. H. Johnson 233* (Herb. Kew).

S. RHODESIA: Inyanga District: Inyanga, 1830 m., Oct. 20, 1935, *F. Eyles 8486* (Herb. Kew.). In grassland, perennial with dirty white flowers, Feb. 18, 1946, *H. Wild 811* (Govt. Herb. No. 14474) (Herb. Kew.). Selborne, occasional in grass-veld, tufted perennial to 30 cm., flowers pink, Jan. 4, 1947, *B. S. Fisher 1189* (Govt. Herb. No. 16512) (Herb. Kew.). Bideford, Feb. 20, 1946, *E. Machell* in Govt. Herb. No. 18664 (Herb. Kew.). At roadside, shrub about 30 cm. high, flowers white, Jan. 21, 1948, *N. C. Chase 693* (Govt. Herb. No. 20504) (TYPUS varietatis in Herb. Kew.). Troutbeck, in open grassland, small woody shrub, *J. M. Rattray 1387* (Govt. Herb. No. 20623) (Herb. Kew.).

Among the tropical species of *Walafrida*, *W. swynnertonii* is readily known by its corymbose inflorescence and very narrow leaves less than 1 mm. wide.

W. swynnertonii, and especially its var. *leiophylla*, are apparently most closely related to *W. tenuifolia* Rolfe in Thiselton-Dyer, Fl. Cap. 5^{1}: 124 (1901) from the Transvaal and Orange Free State, differing in the ciliate bracts, longer corolla-tube, and smaller fruits.]

[**5. Walafrida angolensis** (Rolfe) Rolfe in Thiselton-Dyer, Fl. Cap. 5^{1}: 117. 1901.

Selago angolensis Rolfe in Thiselton-Dyer, Fl. Trop. Afr. **5**: 271. 1900.
Walafrida chongweënsis Rolfe, Jour. Linn. Soc. Bot. **37**: 462. 1906.
Selago chongweënsis (Rolfe) Eyles, Trans. Roy. Soc. S. Afr. **5**: 473. 1916.

Angola, N. and probably S. Rhodesia. *Walafrida chongweënsis* to me seems only a robust condition of *W. angolensis*, with nothing structural to separate it. The rather sparse material of the species suggests that it has creeping rhizomes from which stems or tufts of stems arise, and this is probably anomalous in the genus. In any event it is, as the key indicates, a most distinct and easily named species. The muricate fruits will separate it from all but *W. goetzei*, which in facies alone is widely different.]

[**6a. Walafrida goetzei** (Rolfe) Brenan, comb. nov. var. **goetzei.**

Selago goetzei Rolfe in Engl. Bot. Jahrb. **30**: 402. 1901.

Caules et rami principales inflorescentiae pilis laxis valde flexuosis plus minusve deflexis vestiti, pilis diametrum ramorum plerumque adaequantibus vel superantibus.

This variety is apparently confined to south-western Tanganyika Territory. *Goetze 1043* from the Poroto Mountains is the type. *Stolz 1388, 2545, Geilinger 2731, 2855*, B. XV. No. 19 (all in Herb. Kew) are conspecific. Rolfe compared *S. goetzei* with *S. caerulea* Rolfe, but this is altogether wrong as *S. goetzei* certainly is a *Walafrida* and *S. caerulea* a true *Selago*.]

[6b. **Walafrida goetzei** (Rolfe) Brenan var. **pubescentior** Brenan, var. nov.

Caules et rami principales inflorescentiae pilis longioribus patentibus diametrum ramorum adaequantibus vel superantibus pubescentes.

S. RHODESIA: Melsetter District: Chimanimani Mountains, Bonde Valley, straggling herb to 1 m., flowers lavender, 1520 m., June 5, 1949, *H. C. Wild 2859* (Govt. Herb. No. 23563) (TYPUS varietatis in Herb. Kew.).

This may prove to be merely a habitat-form of var. *goetzei*.]

[6c. **Walafrida goetzei** (Rolfe) Brenan var. **brevipila** Brenan, var. nov.

Caules et rami principales inflorescentiae brevissime crispato-pubescentes, pilis quam diametrum ramorum brevioribus.

TANGANYIKA TERRITORY: Southern Highlands Province, Rungwe District: Bundali Mountains; Issoko, leaves green, flowers whitish-lilac, June 18, 1912, *Stolz 1289* (Herb. Kew.).

S. RHODESIA: Inyanga District: Pungwe Gorge, 1830 m., Aug. 2, 1944, *J. C. Hopkins* in Govt. Herb. No. 12627 (Herb. Kew.). In open grassland, woody bush 60 cm. high, flowers white, 2040 m., Oct. 18, 1946, *H. Wild 1375* (Govt. Herb. No. 15912) (Herb. Kew.). Pungwe Falls, in grass, 1830 m., Sept. 14, 1947, *R. C. Munch 32* (Govt. Herb. No. 17680) (Herb. Kew.). Umtali District: Umtali, Cloudlands Farm, Nov. 1933, *Collector ?* in Forest Herb. Salisbury No. 3 C/33 (Herb. Kew.). Stapleford, to 1 m. high on cool aspects, July 28, 1937, *G. M. McGregor 106* (TYPUS varietatis in Herb. Kew.). Stapleford Forest Reserve, 1520 m., Aug. 2, 1944, *J. C. Hopkins* in Govt. Herb. No. 12630 (Herb. Kew.).]

[7. **Walafrida schinzii** Rolfe, Bull. Herb. Boiss. II. 4: 1011. 1904.

The type-specimen of this in Herb. Kew (*Dinter 370* from Southwest Africa, Waterberg) is scrappy and unrepresentative. It seems closest to *W. paniculata*, but to be a sound species differing in the larger corolla—especially the longer tube—and the larger, broader, obtuse dorsal calyx-lobe. The long linear glabrous or minutely puberulent leaves are also characteristic. The inflorescence seems to be an elongate narrow interrupted panicle built up of sessile to shortly stalked dense glomerules. The species is much in need of recollecting. It is just conceivable that it may be a very abnormally grown lax-inflorescenced form of *W. alopecuroides*.]

[8. **Walafrida paniculata** (Thunb.) Rolfe in Thiselton-Dyer, Fl. Cap. 5[1]: 127. 1901.

Selago paniculata Thunb. Prodr. Fl. Cap. 99. 1800.
Selago lacunosa Klotzsch in Peters, Reise Mossamb. Bot. 255. 1861; Rolfe in Thiselton-Dyer, Fl. Trop. Afr. 5: 272. 1900.
Selago muralis Benth. & Hook. Gen. Pl. 2: 1129. 1876.
Selago dinteri Rolfe in Thiselton-Dyer, Fl. Trop. Afr. 5: 271. 1900.
Selago amboënsis Rolfe in Thiselton-Dyer, Fl. Trop. Afr. 5: 272. 1900.
Walafrida lacunosa (Klotzsch) Rolfe in Thiselton-Dyer, Fl. Cap. 5[1]: 117. 1901.
Walafrida muralis (Benth. & Hook.) Rolfe in Thiselton-Dyer, Fl. Cap. 5[1]: 117. 1901.
Walafrida dinteri (Rolfe) Rolfe in Thiselton-Dyer, Fl. Cap. 5[1]: 117. 1901.
Walafrida fleckii Rolfe, Bull. Herb. Boiss. II. 4: 1011. 1904.
Walafrida cecilae Rolfe, Kew Bull. **1906**: 167. 1906.
Selago cecilae (Rolfe) Eyles, Trans. Roy. Soc. S. Afr. 5: 473. 1916.

In the wide sense taken here *W. paniculata* is found in Portuguese East Africa, N. and S. Rhodesia, Southwest Africa, South Africa, and Madagascar.

The sinking of species here may appear drastic, but, while *W. paniculata* is unquestionably most variable, I have tried in vain to discover any satisfactory characters to split it up, even varietally. Except perhaps for the dorsal calyx-lobe, which may be present or absent, the floral characters are within limits very uniform, but size, habit, and foliage are anything but.

The amount of material of this species from tropical Africa is not large, but it may be approximately sorted into three groups:

(a) cauline leaves mostly 0.5–2 cm. long, flat, linear-lanceolate; heads or spikes narrow, about 2–3 mm. across; corolla-tube about 1 mm. long; fruits small, about 0.5 mm. long. This is *S. lacunosa* Klotzsch and as interpreted by Rolfe in the *Flora of tropical Africa.*

(b) cauline leaves mostly 0.5–1 cm. long, linear; heads or spikes often broader, about 4 mm. across; corolla-tube 1–1.5 mm. long; fruits mostly larger, about 0.8–1 mm. long. This includes *Walafrida cecilae* and *W. fleckii*, and, I consider, typical *W. paniculata.*

(c) cauline leaves very short and narrow, up to 3 mm. long; corolla as in (a); fruits about 0.7 mm. long. This is represented by *J. Gordon Read 22* (Herb. Kew.) from N. Rhodesia; *S. amboënsis* probably comes here also, and possibly also *S. dinteri.*

When specimens from other areas are examined these groups break down. Thus the difference in fruit-size between (a) and (b) is altogether bridged by specimens of *S. muralis* from Madagascar, and the leaves vary enormously in S. African specimens. In this connection I very much doubt whether the South African *Walafrida densiflora* (Rolfe) Rolfe (see Fl. Cap. **5**^{1}: 127. 1901) can be maintained as a separate species from *paniculata*; in tropical Africa certainly I have no doubt that the various leaf-forms from filiform to linear-lanceolate belong to one species.]

[**9. Walafrida alopecuroides** (Rolfe) Rolfe in Thiselton-Dyer, Fl. Cap. **5**^{1}: 117. 1901.

Selago alopecuroides Rolfe, Jour. Bot. **24**: 175. 1886; in Thiselton-Dyer, Fl. Trop. Afr. **5**: 272. 1900.

Angola and Southwest Africa. An exceedingly distinct species, immediately recognisable by its long, dense, tail-like inflorescences.]

VERBENACEAE[48]

Lantana trifolia L. Sp. Pl. 626. 1753.

Lantana salvifolia sensu Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 276. 1900, pro parte; non *L. salvifolia* Jacq.

Lantana mearnsii Moldenke, Phytologia **1**: 421. 1940.

Zomba District: Zomba, *Brachystegia* woodlands of mountain sides, one plant seen, shrub 1.5 m. high, flower white or pinkish, fruit purple, somewhat fleshy, 1100 m., May 26, 1946, *16030.* Zomba Plateau, frequent in open woodlands, shrub 1.1–5 m. high, flower corolla white or pinkish, with yellow centre, fruit purple, 1400 m., May 28, 1946, *16069.* Cholo District: Cholo Mountain, occasional in rainforest regrowths, shrub 1–2 m. high, flower pinkish white, fruit purple, 1200 m., Sept. 21, 1946, *17719.* Widespread throughout tropical Africa, America, and (? introduced into) Asia.

After some hesitation, I have decided to refer all the three gatherings listed above to *Lantana trifolia* L. They are untypical specimens, with opposite leaves and closer indumentum than is usual in the species. Typical *L. trifolia* has distinctly pilose stems and ternate leaves, but weak secondary growths, or etiolate specimens, can be misleading, and the fact that a small portion of a short primary shoot, preserved with *Brass 16069*, bears leaves in threes, makes me suspect that all the specimens are a little abnormal.

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[48] *Lantana* and *Lippia* by R. D. Meikle, Royal Botanic Gardens, Kew.

I am unable to distinguish *Lantana trifolia* from *L. mearnsii*, though some of the varieties described under *L. mearnsii* are most certainly distinct, and should, I think, be given specific rank. *Lantana trifolia* is a very variable species, but I find that nearly all the American varieties (or forms) can be matched with African specimens. It is just possible that the plant has been introduced into Africa; in some areas it behaves as a pestilential weed.

Lippia javanica (Burm. f.) Spreng. Syst. Veg. **2**: 752. 1825; Meeuse, Blumea **5**: 68. 1942.

Verbena javanica Burm. f. Fl. Ind. 12. 1768.
? *Lippia asperifolia* A. Rich. ex Marthe, Cat. Pl. Jard. Méd. Paris 67. 1801; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 280. 1900.
Lippia whytei Moldenke, Phytologia **1**: 428. 1940.

Zomba District: Zomba, frequent in *Brachystegia* woodland of mountain slopes, shrub 1–2 m. high, loosely branched, aromatic, flowers white, 1100 m., May 26, 1946, *16029*. A common plant in many parts of east tropical Africa, ranging from Abyssinia south to Cape Province and west to Angola. ? Also in tropical America, India, and Australasia.

I have followed A. D. J. Meeuse (Blumea **5**: 68. 1942) in using the name *Lippia javanica* for a plant better known to students of the African flora as *Lippia asperifolia* A. Rich. A complete synonymy will be found in the article cited, to which I have added *Lippia whytei* Moldenke, since this plant appears to me to be scarcely more than a narrow-leaved, subsessile-flowered form of *L. javanica*. At the same time, I should point out that the American and Indian specimens in the Kew herbarium, labeled *L. javanica, L. alba*, and *L. geminata*, differ from the African plant in having strictly geminate inflorescences, and larger pink or mauve corollas. It may be that the type-specimen of *L. javanica* agrees with the American rather than the African material, but until it has been examined, I am not prepared to make a change in the proposed nomenclature. *Verbena globiflora* L'Hérit. and *Zappania odoratissima* Scop. are, to judge from the figures given by these authors, conspecific with the African plant.

Lippia plicata Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 281. 1900.

Lippia adoensis Hochst. ex Schauer var. *multicaulis* Hiern, Cat. Welw. Afr. Pl. 1^4: 829. 1900.
Lippia strobiliformis Moldenke, Phytologia **2**: 317. 1947.

Kota-kota District: Nchisi Mountain, occasional in moist gullies in *Brachystegia* woodland, shrub about 1 m. high, branches few, erect, flower corolla white, with yellow throat, 1400 m., July 25, 1946, *16927*. North Nyasa District: Nchenachena, moist situations in *Brachystegia* woodland, shrub about 2 m. high, flowers white with yellow throat, 1340 m., Aug. 21, 1946, *17370*. Tanganyika Territory, Portuguese East Africa, Nyasaland, N. Rhodesia, and Angola.

Clerodendrum rotundifolium Oliv. Trans. Linn. Soc. **29**: 132. *pl. 89*. 1875; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 308. 1900; Thomas, Bot. Jahrb. **68**: 61. 1936.

Clerodendron zambesiacum Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 309. 1900; Thomas, Bot. Jahrb. **68**: 62. 1936.

Cholo District: Cholo Mountain, in rain-forest regrowths, shrub 2 m. high, fruit black when ripe, 1200 m., Sept. 24, 1946, *17790**; ibid., occasional in rain-forest regrowths, shrub 2–3 m. high, fruit black, 1200 m., Sept. 25, 1946, *17801**. Anglo-Egyptian Sudan, Belgian Congo, Uganda, Kenya, Tanganyika Territory, and Nyasaland.

C. zambesiacum is not specifically separable from *C. rotundifolium*; see Brenan, Check-Lists For. Trees & Shrubs Brit. Emp. **5** (Tanganyika Territory, Part 2): 631 (1949), where I have made this reduction.

Clerodendrum swynnertonii S. Moore, Jour. Linn. Soc. Bot. **40**: 166. 1911; Thomas, Bot. Jahrb. **68**: 66. 1936.

Kota-kota District: Nchisi Mountain, among rocks in *Brachystegia* woodland, shrub 3 m. high, flowers dry, apparently white, fruiting calyx red, 1600 m., July 26, 1946, *16971*; ibid., scrambling in rain-forest, shrub 4 m. high, corolla white, filaments pinkish, anthers black, flowers honeysuckle-scented, 1550 m., July 30, 1946, *17038*. Cholo District: Cholo Mountain, in primary rain-forest, climbing shrub to 6 m. high, fruits glossy green, dark, calyx purplish-green, 1400 m., Sept. 26, 1946, *17831*. Tanganyika Territory and S. Rhodesia; now new to Nyasaland.

Clerodendrum uncinatum Schinz, Verh. Bot. Ver. Brandenb. **31**: 206. 1890.

Cyclonema spinescens Oliv. Jour. Linn. Soc. Bot. **15**: 96. 1876; non *C. spinescens* Klotzsch in Peters, Reise Mossamb. Bot. 262. 1861.
Kalaharia spinipes Baill. Hist. Pl. **11**: 111. 1892.
Clerodendron spinescens (Oliv.) Gürke, Bot. Jahrb. **18**: 180. 1893; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 313. 1900; Thomas, Bot. Jahrb. **68**: 89. 1936.
Kalaharia spinescens (Oliv.) Gürke in Engl. Pflanzenw. Ost-Afr. C: 340. 1895.

Lilongwe District: Lilongwe, occasional on roadsides in open woodland, shrub 1 m. high, flowers red, showy, about 1400 m., July 23, 1946, *16881*. Belgian Congo, Tanganyika Territory, Nyasaland, N. Rhodesia, Angola, Bechuanaland, Southwest Africa, and the Transvaal.

The epither *spinescens* cannot be used for this species, since *Cyclonema spinescens* Oliv. is a later homonym.

Phyla nodiflora (L.) Greene, Pittonia **4**: 45–48. 1899.

Verbena nodiflora L. Sp. Pl. 20. 1753.
Lippia nodiflora (L.) Michx. Fl. Bor.-Am. **2**: 15. 1803; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 279. 1900.

Chikwawa District: Lower Mwanza River, occasional on sandy beaches, prostrate herb, stems to 1 m. long, flowers purple, 180 m., Oct. 6, 1946, *17998*. Widespread throughout the tropics, subtropics, and warmer regions of the world, occurring in the Mediterranean region and as an alien as far north as Le Havre in France.

Priva cordifolia (L.f.) Druce,[49] Bot. Exch. Club Brit. Rep. **1916** (suppl. 2): 641. (1917) var. **flabelliformis** Moldenke, Repert. Sp. Nov. **41**: 47. 1936.

Priva leptostachya Juss. Ann. Mus. Hist. Nat. Paris **7**: 70. 1806, nom. illegit. cum syn. *Tertula aspera* Roxb. ex Willd.; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 285. 1900, pro parte.

Cholo District: Nswadzi River, common on grassy beaches, herb 1 m. high, flowers white, 840 m., Sept. 27, 1946, *17847*. The species in India and Ceylon, the variety in Belgian Congo, Uganda, Tanganyika Territory, S. Rhodesia, and now new to Nyasaland; *P. cordifolia* var. *abyssinica* (Jaub. & Spach) Moldenke extends from Arabia to South Africa, and has been found in Nyasaland, so that Mr. Brass' specimen is a new record for Nyasaland only for the variety.

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[49] *Buchnera cordifolia* L. f. Suppl. Pl. 287. 1781.

Vitex doniana Sweet, Hort. Brit. 323. 1827.

Vitex umbrosa G. Don ex Sabine, Trans. Hort. Soc. **5**: 455. 1824; non *V. umbrosa* Sw. Prodr. Veg. Ind. Occ. 93. 1788.

Vitex cuneata Thonn. in Schumach. & Thonn. Beskr. Guin. Pl. 289. 1827; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 328. 1900; Pieper, Bot. Jahrb. **62** (Beibl. 141 ["142"]): 71. 1928.

Vitex cienkowskii Kotschy & Peyr. Pl. Tinn. 27. *pl. 12.* 1867; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 328. 1900.

Kota-kota District: Nchisi, in gullies in *Brachystegia* woodland, tree 10 m. high and 30 cm. in diameter, leaves very dark green above, greyish beneath, fruit purple-black when ripe, edible, native name (Chinyanja) npindimbi, 1350 m., Aug. 1, 1946, *17074.* Widespread in tropical Africa.

LABIATAE

Ocimum americanum L. Cent. I Pl. 15. 1755; Amoen. Acad. **4**: 276. 1759.

Ocimum canum Sims, Bot. Mag. *pl. 2452.* 1824; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 337. 1900.

Blantyre District: Blantyre, in *Brachystegia* woodlands, herb 20–40 cm. high, strongly aromatic, smelling rather like eucalyptus oil, flowers white, 1100 m., June 17, 1946, *16343.* Widespread in tropical Africa and Asia, rare in Brazil.

Ocimum suave Willd. Enum. Pl. Hort. Berol. 629. 1809; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 338. 1900.

Ocimum trichodon Bak. ex Gürke in Engl. Pflanzenw. Ost-Afr. C: 350. 1895; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 338. 1900.

Zomba District: Zomba Plateau, weedy growths on moist open roadsides, shrub 1–1.5 m. high, aromatic, flowers white, bracts green, 1450 m., June 5, 1946, *16271.* Kota-kota District: Nchisi Mountain, plentiful in shrubberies bordering rain-forest, shrub 1.5–2 m. high, fragrant, flowers white, 1650 m., July 31, 1946, *17062.* Widespread on the eastern side of tropical Africa.

Very doubtfully distinct from the Asiatic *O. gratissimum* L. A manuscript note by Mr. B. Verdcourt in Herb. Kew. sinks *O. trichodon* under *O. suave*; I agree; *O. trichodon* seems to be simply a hairy form of the variable *O. suave*, with dense spikes and broad bracts. This form is not confined to Nyasaland, as I have seen an exactly similar specimen in Herb. Kew. from Laboni in the Anglo-Egyptian Sudan (*J. G. Myers 9711*).

Geniosporum rotundifolium Briq. Bot. Jahrb. **19**: 163. 1894; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 351. 1900.

North Nyasa District: Nyika Plateau; Nchena-chena Spur, common in shrubby grasslands, herb about 1 m. high, flowers pale purple, bracts darker purple, 1900 m., Aug. 20, 1946, *17355.* Belgian Congo, southwestern Tanganyika Territory, Angola, and now recorded for the first time from Nyasaland.

I doubt if this is more than a local variant of *G. angolense* Briq.

Geniosporum angolense Briq. Bot. Jahrb. **19**: 164. 1894; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 351. 1900.

Kota-kota District: Nchisi Mountain, plentiful in thin swampy forest of gullies; shrub 60–100 cm. high, leaves rugose, flowers purple, bracts white, the lower ones edged with green, 1400 m., July 25, 1946, *16931.* Angola; new to Nyasaland.

Geniosporum paludosum Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 352. 1900; Robyns, Fl. Spermat. Parc Nat. Albert **2**: 194. *pl. 18.* 1947.

Zomba District: Zomba Plateau, occasional on moist sunny banks of streams, herb 70–90 cm. high, slightly aromatic, leaves rugose, flowers purple, bracts paler purple, 1500 m., June 7, 1946, *16317*. Sierra Leone, Ivory Coast, Nigeria, British Cameroons, Belgian Congo, Uganda, Tanganyika Territory, Nyasaland, N. Rhodesia, Portuguese East Africa, and Angola.

G. paludosum is, I suspect, only a strongly pubescent variant of *G. angolense*.

Acrocephalus callianthus Briq. Bot. Jahrb. 19: 169. 1894; Bak. in Thiselton-Dyer, Fl. Trop. Afr. 5: 360. 1900; Verdoorn, Fl. Pl. S. Afr. 22: *pl. 847*. 1942.

Zomba District: Zomba Plateau, common in *Brachystegia* woodlands and rain-forest regrowths, very showy herb up to 1.5 m. high, corolla pale violet, upper bracts purple, large lower bracts white to lavender at base, 1450 m., June 3, 1946, *16188*. Kota-kota District: Nchisi Mountain, plentiful on edges of forested gullies, herb about 1 m. high, flowers dark, bracts paler purple, 1400 m., July 24, 1946, *16910*; ibid., plentiful in moist gullies in *Brachystegia* woodland, herb 80–100 cm. high, stems simple, erect, flowers purple, 1400 m., Aug. 2, 1946, *17106*. Portuguese East Africa, Nyasaland, N. Rhodesia.

Iboza riparia (Hochst.) N. E. Br. in Thiselton-Dyer, Fl. Cap. 5^1: 300. 1910. *Moschosma riparium* Hochst. Flora 28: 67. 1845.

Mlanje District: Mlanje Mountain; Chambe Plateau, in rocky situations in grasslands, shrub 1.5–2 m. high, flowers white, honey-scented, 1900 m., July 9, 1946, *16766*. Kota-kota District: Nchisi Mountain, plentiful in rocky gullies in *Brachystegia* woodland, shrub 1.5–2 m. high, leaves citronella-scented, flowers white, 1400 m., July 24, 1946, *16909*; ibid., in shrubberies bordering rain-forest, shrub 2–3 m. high, flowers lavender, 1500 m., July 29, 1946, *17018*. Tanganyika Territory, southwards to Natal and the Transvaal.

There is a dried specimen in Herb. Kew. from a plant of this species cultivated at the New York Botanical Garden in 1949 from seeds collected by the Vernay Nyasaland Expedition.

Becium obovatum (E. Mey. ex Benth.) N. E. Br. in Thiselton-Dyer, Fl. Cap. 5^1: 230. 1910.

Ocimum obovatum E. Mey. ex Benth. in E. Mey. Comm. Pl. Afr. Austr. 226. 1837; Benth. in DC. Prodr. 12: 35. 1848.

Ocimum odontopetalum C. H. Wright, Kew Bull. 1907: 54. 1907.

Zomba District: Zomba Plateau, one example in *Brachystegia* woodland, perennial herb 40 cm. high, several stems erect from a very thick woody stock, flowers purple-pink, 1500 m., June 6, 1946, *16283**. Kota-kota District: Nchisi Mountain, occasional on paths in *Brachystegia* woodland, perennial herb 20–35 cm. high, aromatic, shoots erect from a very thick woody stock, flowers pale purple, 1400 m., Aug. 5, 1946, *17136*. Uganda to South Africa, and perhaps even more widely spread.

I feel that other species besides *O. odontopetalum* must be sunk under *B. obovatum*; until this has been done the exact range of this very variable species must remain doubtful.

Hoslundia opposita Vahl, Enum. 1: 212 (1805) var. **decumbens** (Benth.) Bak. in Thiselton-Dyer, Fl. Trop. Afr. 5: 377. 1900.

Hoslundia decumbens Benth. in DC. Prodr. 12: 54. 1848.

Kota-kota District: Chia area, in old garden land, shrub 1 m. high, aromatic, flowers white, fruit-calyx inflated, yellow, 480 m., Sept. 4, 1946, *17526*.* Chikwawa District: Lower Mwanza River, in open forest of river-plain, shrub 3 m. high, flowers greenish-white, fruit inflated, orange, 180 m., Oct. 4, 1946, *17952*. The variety from Eritrea and the Anglo-Egyptian Sudan to the Transvaal, the species also occurring in W. Africa.

Plectranthus cf. **zombensis** Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 402. 1900.

Zomba District: Zomba Plateau, one plant found in open grasslands, perennial herb 80 cm. high, flowers blue, branches of the inflorescence and calyces dark purple, 1800 m., May 31, 1946, *16115*.

P. zombensis is endemic to Nyasaland. The type (in bad condition) shows the young stage with the flowers just coming out, and the inflorescences far more contracted than in *Brass 16115*. More material is needed to prove that the two stages link up, as I believe they will.

Plectranthus albo-violaceus Gürke, Bot. Jahrb. **30**: 397. 1901.

Mlanje District: Upper Ruo River, herb, some leaves purple beneath, corolla white with purple throat, about 850 m., July 4, 1946, *Vernay 16659**. Mlanje Mountain; Likubula-Tuchila Divide, plentiful in forest-openings, shrub 2–3 m. high, strongly aromatic, flowers white with a purple spot on upper lip, 2000 m., July 9, 1946, *16755*. North Nyasa District: Nyika Plateau, common in montane forest undergrowth, shrub 2 m. high, flowers white, upper lip violet, 2400 m., Aug. 18, 1946, *17317*.

P. albo-violaceus has been previously recorded only from the Rungwe Mountains in southwestern Tanganyika, and there is a sheet of the type-number—*Goetze 1140*—in the herbarium of the British Museum (Natural History), which I have examined. A sheet collected in the *Ocotea* forests of the Eastern Aberdares in Kenya Colony (*H. M. Gardner 1395* in Herb. Kew.), previously and wrongly named *P. elegans* Britten, and another sheet collected at 1200 m. on Mount Chiradzulu, Nyasaland, by A. Whyte (*s.n.*) in Herb. Kew., which has until now masqueraded as an unnamed species of *Coleus*, are obviously conspecific.

I feel sure that our plant is rightly identified with *P. albo-violaceus*, but mention must be made of *P. mandalensis* Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 405 (1900). This was described from a cultivated specimen originally from Mandala, Nyasaland, and no other specimens have since been identified with it. The type of *P. mandalensis* has the leaves shortly pointed or subacute at apex and subcordate or truncate at base, not rather attenuate at apex and base as in *P. albo-violaceus*. The inflorescences in the two species seem the same. I had at first, before seeing *P. albo-violaceus*, identified Mr. Brass' specimens with *P. mandalensis*, though with reservations. The leaves of *P. albo-violaceus* vary a good deal in depth of serrations (3–10 mm.), which in some are so deep that they might be called lobes. The length of the lower calyx-teeth also varies. I still feel it quite likely that *P. albo-violaceus* and *P. mandalensis* may be conspecific, especially as the latter was grown under the alien conditions of Kew; but until more evidence has come I think it better to use a later certain name than an uncertain earlier one.

P. albo-violaceus is clearly related to *P. elegans* Britten, q.v., but with smaller and paler corollas, and bracts fringed with long flexuous multicellular hairs ± violet-suffused on the cross-walls.

Brass 17317 is more hairy than the other two numbers cited, but not significantly so in my opinion.

Plectranthus manganjensis Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 406. 1900.

Plectranthus albocaeruleus N. E. Br. Kew Bull. **1901**: 130. 1901.

Cholo District: Cholo Mountain, occasional in rain-forest regrowths, herb 1 m. high, plant fleshy, flowers white and purple, 1200 m., Sept. 19, 1946, *17651*. Endemic to Nyasaland.

I cannot distinguish the above-named plants. *P. manganjensis* is very close to *P. violaceus* Gürke, but with narrower inflorescences, different indumentum on the calyx, and more distantly toothed leaves. From *P. pubescens* Bak. it differs in the smaller bracts and shorter teeth of the fruiting-calyx.

Plectranthus elegans Britten, Trans. Linn. Soc. II. Bot. **4**: 36. 1894; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 411. 1900.

Coleus mahonii Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 434. 1900.
Plectranthus mahonii (Bak.) N. E. Br. ex Hook. f. Bot. Mag. *pl. 7818*. 1902.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common on forest-edges, herb 1–2 m. high, aromatic, branches numerous, erect, flowers deep purple, fruiting calyx purple, later brown, 1890 m., June 30, 1946, *16542*. Endemic to Nyasaland.

I cannot distinguish *P. mahonii*, based on a cultivated plant, from *P. elegans*. *Purves 80* (Tuchila Plateau, Nyasaland, 1800 m., Aug. 1901) in Herb. Kew. is also *P. elegans*.

Plectranthus swynnertonii S. Moore, Jour. Linn. Soc. Bot. **40**: 176. 1911.

Mlanje District: Mlanje Mountain; Luchenya Plateau, a common constituent of primary forest undergrowth, shrub 2–3 m. high, flowers very pale purple, 1890 m., July 12, 1946, *16810*. New to Nyasaland; previously known only from S. Rhodesia.

Our plant has rather larger flowers than the S. Rhodesian specimens. *P. swynnertonii* differs from *P. elegans* Britten in its more irregularly cut leaves, and in having bracts fringed at their apex with rather long pluricellular hairs with violet cross-walls.

Plectranthus swynnertonii S. Moore var.?

Mlanje District: Mlanje Mountain; Luchenya Plateau, common epiphyte on trunks of leaning trees in forest, herb 40–60 cm. high, ascending or erect, internodes swollen, flowers white, 1890 m., June 30, 1946, *16536*; ibid., locally common in forest undergrowth, herb about 50 cm. high, internodes swollen, flowers white, 1890 m., July 6, 1946, *16695*.

The leaves of these two numbers are more attenuate at base than in *P. swynnertonii*, where they are truncate or subcordate; and the flowers are all apparently cleistogamous. Otherwise there is not much between them. More material is wanted to test the constancy of the cleistogamy, and also more of *P. swynnertonii* from S. Rhodesia.

In their leaves *Brass 16536* and *16695* look intermediate between *P. swynnertonii* and *P. elegans* Britten, and I cannot help suspecting the possibility of their being hybrids. Both the possible parents were also collected by Mr. Brass on the Luchenya Plateau, but unfortunately he does not say whether they were growing together or not, or how the possible intermediates occurred.

Plectranthus laxiflorus Benth. in E. Mey. Comm. Pl. Afr. Austr. 228. 1837; in DC. Prodr. **12**: 63. 1848; Cooke in Thiselton-Dyer, Fl. Cap. **5**^{1}: 276. 1910.

Plectranthus violaceus Gürke, Bot. Jahrb. **19**: 201. 1894; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 413. 1900.
Plectranthus kondowensis Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 417. 1900.

North Nyasa District: Nyika Plateau, occasional in shrubby borders of montane forest, herb 2 m. high, leaves purple beneath, flowers white, middle lobe of upper lip pale purple, 2250 m., Aug. 16, 1946, *17256*. Uganda, southwards to the Cape.

I consider that *P. kondowensis* and *P. violaceus* are not separable specifically from the South African *P. laxiflorus*.

Plectranthus dissectus Brenan, sp. nov.

Propter folia profunde dissecta valde insignis, pro *P. schizophyllo* Bak. tantum habenda, foliis plerumque profundius dissectis, rhachidibus inflorescentiarum et pedicellis et calycibus pilis longioribus pubescentibus, verticillastis bifloris, dentibus calycis lateralibus et superioribus triangulari-acutis nec obtusis, inferioribus multo magis acutatis, floribus praesertim tubo corollae multo majoribus facile distinguenda.

Herba perennis 40–60 cm. alta, caulibus patentibus et adscendentibus e caudice carnoso exorientibus. *Caules* crebre ramosi, satis graciles, in statu sicco usque ad 2.5 mm. diametro, pilis minimis arcuato-deflexis dense puberuli, sed internodia pauca suprema pilis patentibus pluricellularibus parietibus violaceo-tinctis apice inconspicue glandulosis plus minusve dense pubescentia. *Folia* opposita vel aliis ramulorum abbreviatorum adjectis ut videtur fasciculata, parva, subtriangularia, brevissime et inconspicue puberula, utrinque sed praesertim subtus glandulis minimis numerosis sessilibus siccitate nigrescentibus notata, bipinnatisecta, petiolo 3–9 mm. longo densiuscule puberulo basi paulum dilatato incluso 0.7–1.5 cm. longa, 0.5–1.5 cm. lata, pinnis 1–2-jugis angustis apicem versus 3–5-fidis, laciniis circiter 1.5–3.5 mm. longis 0.5–1.5 mm. latis obtusis margine incrassatis; folia suprema trifida, ad 3 × 3 mm. deminuta. *Inflorescentiae* caules primarios vel ramos laterales terminantes, 1–3.5 cm. longae, laxae, e 2–5 verticillastris bifloris compositae. *Bracteae* plerumque simplices, minimae, 1–1.5 mm. longae, 1 mm. latae, obtusae, pubescentes. *Pedicelli* 2–4 mm. longi, cum rhachidibus inflorescentiarum ut internodia superiora caulis, q.v., dense vestiti. *Calyx* florifer campanulatus, dentibus inclusis 3–4 mm. longus, ore circiter 2.5–3 mm. latus, ut pedicelli vestitus, dentibus acutis, inferioribus anguste triangularibus 1.3–1.5 mm. longis basi 0.8 mm. latis, aliis triangularibus, lateralibus circiter 1 mm. longis basi 0.6–0.8 mm. latis, superiori circiter 1.3 mm. longo basi 1.4 mm. lato. *Corolla* purpurea; tubus circiter 8–10 mm. longus, basi circiter 0.7 mm. diametro, sursum gradatim ampliatus, circiter 4 mm. supra basim abrupte et acutangule curvatus, praesertim latere antico sparse pubescens; labium superius 9 mm. longum, 6 mm. latum, lobo medio obovato 4 mm. longo apice usque ad 1 mm. emarginato lobulis rotundatis, lobis lateralibus rotundatis 1 mm. longis 2 mm. latis circum medium longitudinis labii positis; labium inferius cymbiforme, concavo-convexum apice rotundatum, 10 mm. longum, 4 mm. altum (a latere visum); labia amba extra sparse pubescentia. *Stamina* 4, declinata, cum toto longitudine tubi corollae connata; filamenta libera 7–8 mm. longa, sursum curvata, glabra; antherae reniformes, circiter 0.8 mm. longae, 0.7 mm. latae, siccitate caerulescentes. *Stylus* circiter 2 cm. longus, glaber, apice breviter et subaequaliter bifidus, lobis lanceolatis subacutis. *Discus* antice in glandulam 1 mm. longam quam ovarium glabrum duplo longiorem productus. *Calyx fructifer* paulum accrescens, usque ad 5–6 mm. longus, dentibus inferioribus usque ad 2.5 mm. longis, lateralibus 1.2 mm. longis, superiori circiter 2–2.5 longo et lato, omnibus acutis. *Nuculae* basi insertae, breviter oblongo-ellipsoideae, apice rotundatae, nitidulae, nigricantes, minutissime verruculosae, 0.8–0.9 mm. longae, 0.7 mm. latae.

Zomba District: Zomba Plateau, occasional in moist situations on an exposed rocky summit, perennial herb 40–60 cm. high, fleshy, branches spreading and ascending from a fleshy stock, flowers purple, 1820 m., May 31, 1946, *16124* (TYPUS in Herb. Kew.).

Although represented by but one number, *P. dissectus* is so outstandingly distinct that it is safe to describe it as new. It belongs to § *Coleoides*, and, on account of its dissected leaves, is liable to confusion with *P. schizophyllus*

Bak., from which it is most abundantly distinct in the points mentioned in the diagnosis above. Although the two species have similar foliage, and are readily separated from other species by that alone, I feel that *P. dissectus* is not really closely related to *P. schizophyllus* but is merely homoplastically similar. The true position of *P. dissectus* must await a revision of *Plectranthus*.

Plectranthus sanguineus Britten, Trans. Linn. Soc. II. Bot. **4**: 36. 1894; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 415. 1900.

Mlanje District: Mlanje Mountain; Luchenya Plateau, scattered over seepage-wet rock-faces, shrub 50–200 cm. high, branches upright, thick and fleshy, leaves fleshy, flowers purple, 1950 m., July 15, 1946, *16844*. Confined to Nyasaland and S. Rhodesia.

Plectranthus crassus N. E. Br. Gard. Chron. III. **35**: 21. 1904; Bot. Mag. *pl. 8030*. 1905.

Mlanje District: Mlanje Mountain; Luchenya Plateau, shrub 50–80 cm. high, branches few, fleshy, erect or ascending from a flattened tuberous base, leaves fleshy, corolla, filaments and style bluish-purple, calyx blackish-purple, 1960 m., July 16, 1946, *16853*. Endemic to Nyasaland.

This species has up till now been only known from cultivated plants originating from Nyasaland. In my opinion *P. crassus* is much more nearly related to *P. sanguineus* Britten than to *P. albocaeruleus* N. E. Br., the latter being the affinity suggested by Brown.

Plectranthus (§ **Coleoides**) sp.

Cholo District: Cholo Mountain, occasional in primary rain-forest, herb 40–50 cm. high, aromatic, flowers blue, 1300 m., Sept. 20, 1946, *17660*.

Not exactly matched; I should like to see further material before deciding on its relationship.

Coleus scaposus C. H. Wright, Kew Bull. **1906**: 167. 1906.

Kota-kota District: Chintembwe, in rocky grasslands, perennial herb, aromatic, roots tuberous, young shoots flowering after burning of the grass, flowers brownish-green, 1400 m., Sept. 9, 1946, *17583**. Nyasaland and S. Rhodesia; doubtful for N. Rhodesia.

When mature leaves of *C. scaposus* are known, I suspect very much that it will prove to be conspecific with *Plectranthus buchananii* Bak. I have dissected a flower from the type of the latter, and it shows very clearly that the stamens are connate at base into a long tube which is slit along the upper side; that it is, in other words, a *Coleus*. The following transference is therefore made: *Coleus buchananii* (Bak.) Brenan, comb. nov. (*Plectranthus buchananii* Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 402. 1900).

While investigating the limits of *Coleus* and *Plectranthus*, I found another species described as a *Plectranthus* but having the stamens similarly united at base: *Coleus myrianthus* (Briq.) Brenan, comb. nov. (*Plectranthus myrianthus* Briq. Bull. Herb. Boiss. II. **3**: 1001. 1903. *Coleus polyanthus* S. Moore, Jour. Bot. **45**: 96. 1907). This plant, from the Transvaal and S. Rhodesia, is near *C. thyrsoideus* Bak. ex Hook. f. Bot. Mag. *pl. 7672* (1899), but has more acute calyx-teeth, longer indumentum on the inflorescence, and differently toothed leaves.

Coleus esculentus (N. E. Br.) G. Taylor, Jour. Bot. **69** (suppl. 2): 158. 1931.

Plectranthus esculentus N. E. Br. Kew Bull. **1894**: 12. 1894.
Plectranthus floribundus N. E. Br. Kew Bull. **1894**: 12. 1894.
Plectranthus floribundus N. E. Br. var. *longipes* N. E. Br. Kew Bull. **1894**: 13. 1894.
Coleus dazo A. Chev. Vég. Ut. Afr. Trop. Franç. **1**: 126. 1905; Hutch. & Dalziel, Fl. W. Trop. Afr. **2**: 292. 1931.

Coleus floribundus (N. E. Br.) Robyns & Lebrun, Rév. Zool. Bot. Afr. **16**: 359. 1928; non *C. floribundus* Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 438. 1900.

Kota-kota District: Nchisi Mountain, close to rocks in *Brachystegia* woodland, shrub 1 m. high, deciduous, leaves not seen, flowers bright yellow, 1400 m., July 24, 1946, *16885**. Kasungu District: Kasungu, in *Brachystegia* woodland, leafless shrub, flowers yellow, 1000 m., Aug. 20, 1946, *Shortridge 17397**; ibid., in second-growth woodlands, uncommon, shrub 60–100 cm. high, deciduous, leafless, aromatic, flowers yellow, 1000 m., Aug. 27, 1946, *17436*. Uganda to South Africa; also in W. Africa.

Coleus shirensis Gürke, Bot. Jahrb. **19**: 216. 1894; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 443. 1900; N. E. Br. Bot. Mag. *pl. 8024*. 1905.

Coleus punctatus Bak. Kew Bull. **1895**: 291. 1895; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 444. 1900.

Mlanje District: Likubula Gorge, frequent on river-banks in rain-forest, shrub 2–3 m. high, aromatic, flowers violet, 840 m., June 20, 1946, *16370*. Kota-kota District: Nchisi Mountain, plentiful in moist semi-shade of forest along streams, shrub 1.5–2.5 m. high, aromatic, flowers dark purple, conspicuous, 1400 m., July 24, 1946, *16903*. Nyasaland and N. Rhodesia, with very close relatives as far north as Uganda.

Englerastrum hjalmari T.C.E.Fr. Notizbl. Bot. Gart. Berlin **9**: 71. 1924.

Englerastrum kassneri T.C.E.Fr. Notizbl. Bot. Gart. Berlin **9**: 70. 1924.
Plectranthus kassneri (T.C.E.Fr.) Hutch. & Dandy, Kew Bull. **1926**: 481. 1926.
Plectranthus hjalmari (T.C.E.Fr.) Hutch. & Dandy, Kew Bull. **1926**: 481. 1926.

Kota-kota District: Nchisi Mountain, on now dry seepage-slope in *Brachystegia* woodland, gregarious, 20–40 cm. high, flowers blue, 1400 m., July 25, 1946, *16935*. Belgian Congo, southwestern Tanganyika Territory, N. Rhodesia, and now new to Nyasaland.

We are keeping this in *Englerastrum* in view of its habit and corolla, rather than in *Plectranthus* as Hutchinson and Dandy do, or in *Coleus* as Robyns and Lebrun advocate. The additional specimens now available lead us to believe that *E. kassneri* and *E. hjalmari* are merely different stages in development of the same species, in which the fruiting-calyx is strongly accrescent (Miss E. A. Bruce and J. P. M. Brenan).

Holostylon baumii (Gürke) G. Taylor, Jour. Bot. **69** (suppl. 2): 161. 1931.

Plectranthus baumii Gürke in Warb. Kunene-Samb. Exp. Baum 356. 1903.
Holostylon gracilipedicellatum Robyns & Lebrun, Ann. Soc. Sci. Brux. **49**^{2}(Mém.): 103. 1929.

Mombera District: 10 miles N. of Mzimba, on sandy soil in *Brachystegia* woodland, herb 80–100 cm. high, flowers blue, 1350 m., Aug. 9, 1946, *17146*. Belgian Congo, N. and S. Rhodesia, and Angola; this is the first record for Nyasaland.

Aeolanthus njassae Gürke in Engl. Pflanzenw. Ost-Afr. C: 346. 1895; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 393. 1900, p.p., quoad spec. *Buchanan 524, 529*.

Zomba District: Zomba Plateau, common in rock-crevices on an exposed bluff, perennial herb 20–50 cm. high, fleshy, aromatic, branches ascending, flowers pale purple, bracts often dark purple, 1500 m., June 2, 1946, *16161*. Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional in shallow rocky soil in grasslands, herb 40–60 cm. high, fleshy, aromatic, viscid, flowers pinkish-white, bracts purple-red, 2000 m., July 11, 1946, *16795*; west slopes, occasional on open rocky slopes, herb, leaves fleshy, reddish, corolla pale purple, bracts dark purple, 1850 m., July 18, 1946, *16863**. Nyasaland; doubtfully in Angola.

Aeolanthus serpiculoides Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 395. 1900.

Zomba District: Zomba Plateau, frequent on dry rocks and on rocky seepage-slopes, perennial herb, branches prostrate, radiating from a small fleshy stock, leaves reddish, thick and succulent, those of the lower nodes much crowded, corolla purplish-white, upper lip mottled with purple, 1500 m., June 5, 1946, *16240*; ibid., common on exposed dry rocks and on sunny seepage-slopes, herb, branches prostrate, leaves succulent, reddish, flowers pale purple, 1500 m., June 9, 1946, *16328*. Endemic to Nyasaland.

Alvesia rosmarinifolia Welw. Trans. Linn. Soc. **27**: 55. *pl. 19*. 1869; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 378. 1900.

BELGIAN CONGO: Leopoldville, frequent on savannah hillside, shrub 1.5–2 m. high, virgate with showy terminal inflorescence, flowers pink, fruit dry, 400 m., May 12, 1946, *16021**. Belgian Congo, N. Rhodesia, and Angola.

Pycnostachys stuhlmannii Gürke in Engl. Pflanzenw. Ost-Afr. **C**: 345. 1895; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 380. 1900; E. A. Bruce, Kew Bull. **1939**: 586. 1939.

Pycnostachys remotifolia Bak. Kew Bull. **1898**: 161. 1898; in Thiselton-Dyer, Fl. Trop. Afr. **5**: 381. 1900.

Mlanje District: Likubula, in marshes, herb 60–110 cm. high, stems 4-angled, erect, flowers caerulean blue, 820 m., June 27, 1946, *16488*. Uganda and the Belgian Congo, southwards to S. Rhodesia.

Pycnostachys urticifolia Hook. Bot. Mag. *pl. 5365*. 1863; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 386. 1900; E. A. Bruce, Kew Bull. **1939**: 590. 1939.

Zomba District: Zomba Plateau, occasional on woodland roadsides, shrubby herb 1.5 m. high, aromatic, branches few, erect, flowers not seen, 1500 m., June 5, 1946, *16262*; ibid., common on roadsides in woodlands, herbaceous shrub 1.5–2 m. high, very showy, young branchlets and leaves reddish, flowers very vivid blue, fruit last season's, 1500 m., June 11, 1946, *16332*. Tanganyika Territory, Portuguese East Africa, Nyasaland, S. Rhodesia, and the Transvaal.

Pycnostachys schliebenii Mildbr. Notizbl. Bot. Gart. Berlin **11**: 405. 1932; E. A. Bruce, Kew Bull. **1939**: 590. 1939.

Pycnostachys oblongifolia Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 385. 1900, p.p., excl. *Scott-Elliot 7883*.

North Nyasa District: Nyika Plateau, common in second-growth montane forest of escarpment, shrub 2 m. high, flowers bright blue, calyx and reduced upper leaves reddish, 2200 m., Aug. 17, 1946, *17296*. Tanganyika Territory and Nyasaland.

Satureja [''Satureia''] **punctata** [R. Br. in Salt, Voy. Abyss. App. 64. 1814, nomen nudum] (Benth.) Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4^{3A}: 299. 1896; Pichi-Sermolli, Miss. Stud. Lago Tana **7** (Ricerche Bot. 1): 125. 1951.

Micromeria punctata Benth. Lab. Gen. & Sp. 378. 1834; in DC. Prodr. **12**: 220. 1848.
Micromeria biflora sensu Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 452. 1900, pro parte; non *M. biflora* (Buch.-Ham. ex D. Don) Benth.

North Nyasa District: Nyika Plateau, common on grassy edges of forest, shrub 70–80 cm. high, aromatic, with one or several stems erect from a thickened stock, flowers pinkish-white, 2300 m., Aug. 11, 1946, *17177*. Anglo-Egyptian Sudan to South Africa; also in the British Cameroons.

Satureja [''Satureia''] **biflora** (Buch.-Ham. ex D. Don) Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4^{3A}: 299. 1896.

Thymus biflorus Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 112. 1825.

Micromeria biflora (Buch.-Ham. ex D. Don) Benth. Lab. Gen. & Sp. 378. 1834; Benth. in DC. Prodr. **12**: 220. 1848; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 452. 1900, pro majore parte.

Zomba District: Zomba Plateau, among tall grass on a rocky slope; herb 75 cm. high, corolla white with three purple spots on lower lip, 1430 m., May 29, 1946, *16077*; ibid., in dense clumps on exposed rocks, 30 cm. high, flowers white, blotched with purple, 1430 m., May 30, 1946, *16096*. Mlanje District: Mlanje Mountain; Luchenya Plateau, common in rocky grasslands, herb 10–20 cm. high, 2150 m., June 27, 1946, *16466*. Abyssinia to South Africa; also in India.

Satureja masukuënsis (Bak.) Eyles, Trans. Roy. Soc. S. Afr. **5**: 462. 1916.

Leucas masukuënsis Bak. Kew. Bull. **1898**: 162. 1898; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 476. 1900.

Nepeta usafuënsis Gürke, Bot. Jahrb. **30**: 394. 1901.

Calamintha masukuënsis (Bak.) S. Moore, Jour. Linn. Soc. Bot. **40**: 179. 1911.

North Nyasa District: Nyika Plateau, common locally in open grasslands, shrub 1 m. tall, mint-scented, erect, sparsely branched, flowers white, 2350 m., Aug. 16, 1946, *17248*. Tanganyika Territory, Nyasaland, and S. Rhodesia.

The type-specimen of *Nepeta usafuënsis* (*Goetze 1131* from the Poroto Mts. in southwestern Tanganyika Territory) is now presumably destroyed. The description however agrees well with a specimen subsequently collected there (*Greenway 3551*) and with a sheet issued from Berlin with the name *Nepeta usafuënsis* on it (*Stolz 376*), both of which are certainly *S. masukuënsis*. Gürke described the calyx of *Nepeta usafuënsis* as 15-ribbed, but I believe this to be an error of observation; in all the specimens I have looked at it is 13-ribbed.

Satureja vernayana Brenan, sp. nov.

S. myrianthae (Bak.) Brenan (vide infra) affinis, foliis basi angustatis apice obtusis nec acutis differt.

Herba vel frutex usque ad 90 cm. alta, erecta, perennis, stolonifera, pulegii graveolens (fide cl. Brassii in sched.). *Caules* usque ad 3 mm. diametro, tetragoni, brunneo-purpurascentes, pilis adscendentibus breviter griseo-pubescentes, subsimplices, ramos breves vel brevissimos adscendentes emmittentes. *Folia* opposita, firma, parva, elliptica vel obovato-elliptica, 0.7–1.5 cm. longa, 0.3–0.9 cm. lata, subintegra, denticulis utrinque 1–4 valde inconspicuis praedita, basi cuneata, apicem obtusum versus plus minusve angustata, supra glabra vel sub lente valido et basim versus praesertim minute puberula necnon impresse punctata, costa et nervis lateralibus impressis vel inconspicuis, subtus pallidiora, creberrime ac conspicue glanduloso-punctata, costa nervisque lateralibus utrinque 2–4 prominulis sursum adversis puberulis exceptis glabra, venulis hand cernendis; petiolus brevissumus, 1–2.5 mm. longus. *Inflorescentiae* terminales, spiciformes, 9–15 cm. longae (vel eae ramos laterales terminantes multo breviores), circiter 1.5 cm. diametro, saepe leviter purpurascentes; verticillastri dense multiflori, conferti vel inferiores 1–2 cm. inter sese distantes. *Bracteae* inferiores foliis supremis similes, sessiles, ellipticae, 0.6–1 cm. longae, 0.3–0.6 cm. latae, superiorae gradatim minores, supremae circiter 5 × 2 mm. *Bracteolae* lineari-lanceolatae, valde acuminatae, 6–7 mm. longae, 0.5–1 mm. latae, pubescentes. *Flores* subsessiles; hermaphroditi tantum cogniti; pedicelli 0.5–1 mm. longi, pubescentes. *Calyx* dentibus inclusis circiter 7.5 mm. longus, extra dense patule pubescens; tubus elongato-campanulatus, 13-nervius, extra glandulis sessilibus aureis numerosis gemmatus, intus glaber, dorso 5.5 mm. longus, ventre 4.5 mm. longus, dentes elongato-triangulares, acuminatae, pubescentes, tres postici 2 mm. longi basi 0.6 mm. lati, quam duo antici 3 mm. longi basi 0.8 mm. lati paulo breviores. *Corolla* alba; tubus circiter 5.5 mm. longus, basi 1 mm. diametro, sursum paulo ampliatus, extra inferne glaber superne appresse pubescens; labium superius leviter concavo-convexum, oblongo-ellipticum, extra pubescens, intus glabrum, circiter 5 mm. longum 3.2 mm. latum, apice leviter et obtuse bilobatum, sinu 0.4 mm. alto; labium inferius circiter 3.5 mm. longum, lobo medio obovato apice rotundato 2.5 mm. longo 2.2 mm. lato, lobis lateralibus oblongo-obtusis 2 mm. longis 1.5 mm. latis, omnibus praeter imam basim glabris. *Stamina* 4; filamenta staminum posticorum circiter 4.5 mm. longa, anticorum circiter 5.5 mm. longa, omnia glabra; antherae reniformes, circiter 0.5 mm. longae, 0.7 mm. latae, rubro-purpureae. *Stylus* 11 mm. longus, deflexus, glaber, apice inaequaliter bifidus, lobis lanceolatis acutis. *Ovarium* glabrum. *Nuculae* ignotae.

Zomba District: Zomba Plateau, 1370 m., Sept. 1895, *A. Whyte s. n.* (Herb. Kew.). Mlanje District: Mlanje; Tuchila Plateau, plant 1 m. high, flowers white, 1830 m., May 1901, *J. M. Purves 13* (TYPUS in Herb. Kew.). Mlanje Mountain; Luchenya Plateau, common locally in rocky grasslands, shrub 50–80 cm. high, strongly pennyroyal-scented, stoloniferous, flowers cream-coloured, 2180 m., July 3, 1946, *16643*.

S. vernayana is one of a small but very natural group of species in tropical Africa about whose systematic position there have been hitherto very conflicting ideas.

The first member of the group to be described was *Nepeta robusta* Hook. f. This was a bad mistake for, in spite of a certain resemblance to *Nepeta* in facies, the anticous stamens are obviously longer than the posticous, and this completely contradicts the principal character of the tribe *Nepeteae*. Following Hooker, three other binomials have been made in *Nepeta* for relatives of *Nepeta robusta*.

In 1898 Baker described two species under *Leucas*, an equally unhappy shot, for not only had his species 5 calyx-teeth, not 8–10 as in *Leucas*, but the not or scarcely arcuate stamens remove them widely.

One of Baker's species was transferred by S. Moore in 1911 to *Calamintha*, and Dr. G. Taylor added a new species under the same genus in 1931. There is, I think, no doubt that our plants belong to the tribe *Saturejineae* and that they are closely related to *Calamintha*. Stamens and corolla both support this.

If this is accepted there are further difficulties. Briquet, in Engl. & Prantl, Nat. Pflanzenfam. **4**^{3A}: 296 (1896), made *Satureja* L. an "omnibus" genus, including under it *Calamintha* and *Micromeria* among others. There is no doubt that if Briquet be followed our plants should be placed under *Satureja*. I consider that it is preferable to accept Briquet's classification rather than that of Bentham in DC. Prodr. **12**. *Calamintha* and *Micromeria* are certainly most closely related, but by Bentham's classification and by that of Baker in the *Flora of tropical Africa* the not or scarcely bilabiate calyx with subequal teeth common to all the species of the group that we are discussing surely indicates *Micromeria* and not *Calamintha* as the right genus. Indeed it is surprising that no species of the group has so far been described under *Micromeria*.

I cannot find any close affinity among the hitherto described species of *Micromeria*. There is a certain resemblance in foliage, habit, and to a lesser extent inflorescence among that group of European and Mediterranean species which includes *M. pulegium* (Roch.) Benth., *M. thymifolia* (Scop.) Fritsch, and *M. bulgarica* (Vel.) Hayek; and a stronger resemblance in calyx and inflorescence to *M. staminea* Boiss. & Hohen., which although later transferred by Boissier to *Calamintha* should surely have been left in *Micromeria* where it was originally described, and where Bentham retained it. But when all this is said and done the African plants remain a very distinct group.

One matter that requires mention here is the dimorphic flowers of several or very likely indeed all the species. The flowers may be hermaphrodite with exserted stamens and style, or female with included stamens and exserted style. The female flowers have shorter corollas and calyces than the hermaphrodite. Each individual plant bears flowers of one or the other kind exclusively. It is obvious that great care must be taken if the size of calyx or corolla is used to separate species in this group. The occurrence of dimorphic flowers will be noted under each species.

As we have said, on Bentham's classification our group would make a new section of *Micromeria* akin to the section *Pseudomelissa* Benth. Until *Satureja* can be completely revised I feel it better to describe but not to name this group:

Herbae vel frutices robustae. Folia lata, saltem inferiora plus minusve dentata. Inflorescentiae spiciformes, densae vel inferne aliquid interruptae; verticillastri sessiles, densi, undique spectantes, flores sessiles vel subsessiles. Corollae ubi cognitae albae vel albidae.

A key to the species and varieties of this group follows.

- Cauline leaves obtusely pointed or rounded at apex.
  - Cauline leaves conspicuously and ± closely crenate-serrate, teeth 6–12 on each margin, pubescent on and between primary lateral nerves beneath; venation forming a conspicuous network impressed above and raised beneath. 1. *S. robusta.*
  - Cauline leaves very inconspicuously denticulate, often subentire, teeth 1–4 on each margin, puberulous on midrib and primary lateral nerves beneath, not between them; venation not or scarcely visible. 4. *S. vernayana.*
- Cauline leaves acute at apex.
  - Calyces very minutely puberulous, appearing subglabrous; leaves ovate, with up to 6 small teeth on margins. 5. *S. cacondensis.*
  - Calyces densely and obviously pubescent:
    - Cauline leaves small, up to 1.7 cm. long, very shortly pointed at apex, ± densely pubescent beneath. 2. *S. masukuënsis.*
    - Cauline leaves larger, more than 2 cm. long, rarely less, much more tapering at apex and less pubescent beneath:
      - Cauline leaves broadly ovate, very broadly rounded to subcordate at base, mostly 2–3 cm. wide; spikes robust, 8–16 cm. long and 1.5–2 cm. wide; hermaphrodite flowers about 13 mm. long. 3a. *S. myriantha* var. *myriantha.*
      - Cauline leaves ovate, rounded to cuneate at base, mostly up to 1.5 cm. wide; spikes less robust, up to about 8 cm. long and 1.5 cm. wide; hermaphrodite flowers about 11 mm. long.
        - Stems up to inflorescence pubescent with spreading flexuous hairs. 3b. *S. myriantha* var. *wellmanii.*
        - Stems up to inflorescence puberulous with very short hairs. *S. myriantha* var. *brachytricha.*

[**1. Satureja robusta** (Hook. f.) Brenan, comb. nov.

Nepeta robusta Hook. f. Jour. Linn. Soc. Bot. **7**: 212. 1864; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 460. 1900.

Confined to the Cameroon Mountain and Bamenda Highlands. Old Calabar, given in the *Flora of tropical Africa*, is an impossible locality for this species, though it might well occur further north in the Oban Hills.

Floral dimorphism very marked. Hermaphrodite flowers (from *Mann 1294*): calyx 5–6 mm. long; corolla 9–10 mm. long. ♀ flowers (from *Maitland 1399*): calyx 3–4 mm. long; corolla 5–6 mm. long.]

2. Satureja masukuënsis (Bak.) Eyles. Vide supra.

Most of the gatherings of this species are hermaphrodite, including the type. *Stolz 376*, from southwestern Tanganyika Territory, is partly of hermaphrodite and partly of female plants.

[3a. **Satureja myriantha** (Bak.) Brenan, comb. nov., var. **myriantha.**

Leucas myriantha Bak. Kew Bull. **1898**: 163. 1898; in Thiselton-Dyer, Fl. Trop. Afr. **5**: 475. 1900.

Caules dense pubescentes. Folia caulina late ovata, basi late rotundata vel subcordata, plerumque 2–3 cm. lata. Inflorescentiae robustae, 8–16 cm. longae, 1.5–2 cm. latae; flores hermaphroditi circiter 13 mm. longi.

Nyasaland. Not recollected since the syntypes (*Whyte 178, 214, s.n.*).]

[3b. **Satureja myriantha** (Bak.) Brenan var. **wellmanii** (C. H. Wright) Brenan, comb. nov.

Nepeta wellmanii C. H. Wright, Kew Bull. **1909**: 380. 1909, pro parte.

Caules usque ad inflorescentias pilis flexuosis patentibus pubescentes. Folia caulina ovata, basi rotundata usque cuneata, plerumque usque 1.5 cm. lata. Inflorescentiae quam in var. *myriantha* minus robustae, usque circiter 8 cm. longae et 1.5 cm. latae; flores hermaphroditi circiter 11 mm. longi.

Angola; not recollected there since the type (*Wellmann s.n.*), but a specimen from the Belgian Congo in Herb. Kew. (Lusaka, 28 May 1908, *Kassner 2895*) is, I believe, conspecific.]

Nepeta huillensis Gürke, Bot. Jahrb. **36**: 121 (1905) is from the description certainly a *Satureja* in this affinity. It might well be *S. myriantha* var. *wellmanii*, except for the fact that Gürke describes the leaves of *N. huillensis* as glabrous on both sides, 10–15 mm. long and 6–12 mm. wide; the difference in size I do not think of much importance, and in view of Gürke's description of the lower bracts of *N. huillensis* as hairy, I cannot help suspecting that the leaves may not have been sufficiently precisely observed.

Nepeta huillensis was based on *Antunes 73* from Huilla in Angola. The type is destroyed. In response to a request, the Director of the Instituto Botânico Dr. Júlio Henriques of the University of Coimbra informs me that there is no duplicate there. It may later prove possible to interpret *N. huillensis* more precisely, but for the time being, I think it best to leave it as doubtful.

[3c. **Satureja myriantha** (Bak.) Brenan var. **brachytricha** Brenan, var. nov.

Nepeta wellmanii C. H. Wright, Kew Bull. **1909**: 380. 1909, pro parte.

Caules usque ad inflorescentiae pilis minimis puberuli. Aliter ut in var. *wellmanii.*

ANGOLA: Benguela District: Bailundo, 1525 m., 1906, *Dr. F. C. Wellman s.n.* (TYPUS varietatis in Herb. Kew.). Huila District: Quilemba-Chele, suffrutescent, in hiemisilva, 4 June 1937, *Gossweiler 10991* (Herb. Kew.).

One sheet of Wellman's original gathering in Herb. Kew. differs markedly from the others in the indumentum on the stems, and I am making it the type of this new variety.

In var. *myriantha* hermaphrodite flowers alone are known. In var. *wellmanii* the type-gathering consists partly of female and partly of hermaphrodite plants, while *Kassner 2895* is entirely female. In var. *brachytricha* only hermaphrodite flowers have been collected.]

4. **Satureja vernayana** Brenan. Vide supra.

Only hermaphrodite flowers are known.

5. **Satureja cacondensis** (G. Taylor) Brenan, comb. nov.

Calamintha cacondensis G. Taylor, Jour. Bot. **69** (suppl. 2): 167. 1930.

Confined to Angola (*Gossweiler 2860, 2861*). Hermaphrodite flowers alone are known.]

Satureja pseudosimensis Brenan, sp. nov.

Affinis *S. simensi* (Benth.) Briq. foliis brevissime (0.5–1.5 mm.) petiolatis, basi late rotundatis vel subcordatis, nervis supra plerumque impressis, calyce majore plerumque 5–7 mm. longo, dentibus anticis plerumque 2–2.5 mm. longis, staminibus fertilibus 4, posticis bene evolutis nec ad staminodia reductis.

Herba perennis, aromatica, procumbens vel adscendens, usque ad 60 (–120) cm. alta, basi multicaulis (? vel raro simplex vel subsimplex). *Caules* usque ad 3 mm. diametro, inferne saepe lignescentes, tetragoni, virides vel purpurascentes, plus minusve goniotrichi, pubescentes, pilis minimis patentibus cum aliis multo longioribus etiam patentibus immixtis. *Folia* opposita, parva, ovata vel ovato-orbicularia, chartacea, 0.5–2 (–2.5) cm. longa, (0.3–) 0.5–1.9 cm. lata, crenato-serrulata, denticulis utrinque 3–6 plerumque inconspicuis, basi late rotundata vel subcordata, ad apicem obtusum vel acutum angustata, supra ad costam et saepe etiam ad nervos laterales puberula, aliter subglabra vel nonnunquam pilis longioribus ubique plus minusve pubescentia, costa et nervis lateralibus utrinque (3–) 4–6 (–7) saepius impressis, subtus pilis longiusculis crebris pubescentia necnon glandulis minimis numerosis sessilibus gemmata, costa et nervis lateralibus prominulis vel prominentibus, venulis paucis inconspicuis; petiolus brevissimus, 0.5–1.5 mm. longus, pubescens. *Inflorescentiae* e verticillastis umbellatis pluri- vel multifloris (3–15-floris) ex axillis superioribus caulis primarii et ramorum lateralium exorientibus compositae, inferne laxae, superne plerumque approximatae. *Bracteae* inferiorae foliis supremis similes, superiorae gradatim minores, foliaceae, supremae 3 mm. longae 1 mm. latae, integrae. *Bracteolae* filiformi-subulatae, 3–5 mm. longae, pubescentes. *Flores* 2–5 mm. longe pedicellati; pedicelli pubescentes. *Calyx* dentibus inclusis circiter 5.5–7 mm. longus, extra dense patule pubescens etiam glandulis numerosis sessilibus, saepe atropurpurascens; tubus 13-nervius, basi subtus gibbosus, intus annulo pilorum prorsum adversorum circiter 1 mm. ab ore tubi inserto ornatus, 4–5 mm. longus; dentes anguste triangulares, acutissimi; labium superius 2–2.5 mm. longus, dentibus 1.5 mm. longis; dentes inferiores 1.7–2.5 mm. longi. Corolla purpurea, circiter 8–10 mm. longa; tubus circiter 6–7.5 mm. longus, basi 0.75 mm. diametro, sursum paulo ampliatus, extra inferne glaber superne breviter pubescens; labium superius 2.5–3 mm. longum, 2.5 mm. latum, apice rotundato breviter emarginatum extra breviter pubescens, intus glabrum; labium inferius 3 mm. longum, extra sparse pubescens, lobo medio obovato apice emarginulato 1.3 mm. longo et lato, lobis lateralibus 1 mm. longis 1.2 mm. latis apice rotundatis. *Stamina* fertilia 4, filamentis posticis 3–4 mm. longis anticis 5 mm. longis. *Stylus* 10.5 mm. longus, apicem inaequaliter bifidum versus puberulus. *Ovarium* glabrum. *Nuculae* stramineae usque brunneae, ellipsoideae, laeves, 0.6–0.7 mm. longae, 0.4–0.5 mm. latae.

All specimens are in Herb. Kew. unless another place is specified.

BRITISH CAMEROONS: Victoria Division: Cameroon Mountain, 3200 m., Jan. 1862, *Mann 1293*; ibid., herbaceous plant 60 cm. high, 2130 m., Jan. 1862, *Mann 1302*; ibid., 2740–3050 m., Dec. 1862, *Mann 2031*; ibid., upper slopes, flowers pinky-white, *H. H. Johnston 21*; ibid., *H. H. Johnston 49*; ibid., above Buea, bush in lavacleft, 2800 m., Dec. 22, 1928, *Mildbraed 10878*; ibid., Nyanga Camp, on edge of grassland and woodland, rambling, 2130 m., Jan. 1930, *Maitland 974*; ibid., forest plant, 2320 m., Dec. 1930, *Maitland 1196*; ibid., No. 2 Hut, among grass and bushes in small depressions, 2740 m., Jan. 1931, *Maitland 1242*.

FERNANDO PO: Clarence Peak, herbaceous plant 60 cm. high, calyx green, corolla purple, 2590 m., Dec. 1860, *Mann 617*. Summit of the Pico de Santa Isabel, Mar. 1, 1947, *Emilio Guinea 2821*.

BELGIAN CONGO: District des Lacs Édouard et Kivu: Lava plain between L. Kivu and L. Edward, 1460–2000 m., Apr.-May 1929, *Humbert 7884* (Herb. Mus. Brit.). In glade near Akeley's grave in pass between Mikeno and Karisimbi, on lava rocks, local, pink

flowered herb with aromatic leaves, 2740 m., Dec. 24, 1930, *B. D. Burtt 3046*. E. slope of Nyiragongo, Nov. 1937, *Lebrun 8735*. (See also *Burtt 2875* under Uganda, below.)

RUANDA-URUNDI: Kisozi, June 19, 1934, *Lejeune 170*.

ANGLO-EGYPTIAN SUDAN: Imatong Mountains, Loyoru, frequent on edge of forest, herb 45 cm. high, flowers mauve, 2320 m., Dec. 29, 1935, *A. S. Thomas 1781*.

UGANDA: Western Province, Kigezi District: Muhavura, W. face, straggling herb in grass, flowers pink, 2290 m., without date, *Eggeling 1039*. Mount Mgahinga, common in bamboo zone, usually near bushes, aromatic spreading and ascending herb 30–60 cm. high, flowers blue, 2440–2740 m., Oct. 22, 1929, *Snowden 1575*; ibid., drier parts of swampy meadow, frequent, shrubby, 60 cm. high, flowers deep mauve, 2130 m., Dec. 19, 1933, *A. S. Thomas 1063*. Behungi, in bamboo zone, frequent, aromatic undershrub, prostrate, or woody stems ascending to 60 cm., lilac flowers in whorls, 2440 m., Dec. 23, 1933, *A. S. Thomas 1181*. "Summit," mountain road, Kigezi, in Bamboo zone, nearly prostrate herb, very fragrant, flower purplish, 2440 m., June 4, 1938, *Tothill 2741*. Kachwekano, short grassland, herb 30 cm. high, with purple flowers, 2130 m., May 1939, *Purseglove 710*; ibid., in permanent pasture, herb 22–35 cm. high, flowers pink, very aromatic, native name (Lukiga) ejoji, 2130 m., May 1949, *Purseglove 2827*. ? Kigezi District or Belgian Congo: Gahinga Volcano, on exposed lava outcrop, local, pink flowered herb, 3200 m., Dec. 10, 1930, *B. D. Burtt 2875*. Eastern Province, Mbale District: Mount Elgon, short grass by roadside, aromatic herb 30 cm. or more high, with blue flowers, 2440–3050 m., Oct. 21, 1916, *Snowden 435* (Herb. Kew., Herb. Mus. Brit.); ibid., Butandiga, in thickets, flowers pink, 2130 m., Jan. 1918, *Dümmer 3698*; ibid., Bulambuli, in bamboo zone, semi-procumbent herb 60–90 cm. high, flowers purple, aromatic, 2740 m., Nov. 12, 1933, *Tothill 2392*; ibid., edge of forest among short grass, 60 cm. high, flowers purple, 2740 m., Aug. 1934, *P. M. Synge S. 1093* (Herb. Mus. Brit.); ibid., Gabaralome, in heather zone, very common herb, flowers mauve, 3170 m., Dec. 14, 1938, *A. S. Thomas 2687*. Without locality, *R. Fyffe 16/15*.

KENYA COLONY: Rift Valley Province, Ravine District: Two days march from Eldama, 1898, *A. Whyte Ml*. Nakuru District: Grown at Scott Labs. from root from Molo, in open woodland and light bush country, 2440 m., Sept. 7, 1932, *V. A. Beckley 2009*. ? Rift Valley Province, Naivasha District; or Central Province, Fort Hall District: Aberdare Mountains, 1905, *Sir Evan James s. n.* Kinangop, W. Aberdares, growing in scrub, procumbent herb to 15 cm., flowers purplish, Dec. 1929, *I. R. Dale 2157* (TYPUS speciei in Herb. Kew.); ibid., in and on edge of forest, leaves aromatic, calyx dark purple, flowers pale purple, 2440 m., Dec. 20, 1930, *Miss E. R. Napier 621*; ibid., in shade of forest, herb with rather trailing habit, flowers pale purple, aromatic, 2440 m., Dec. 21, 1930, *Miss E. R. Napier 639*; ibid., in grassland and on edge of forest, herb about 60 cm. high, flowers pinky-mauve, aromatic, 2440 m., Dec. 28, 1930, *Miss E. R. Napier 708*; ibid., crevices among rocks above river, up to 45 cm. high, aromatic, thyme-scented, flowers pink-mauve, 2680–2710 m., Apr. 1938, *Chandler 2225*. ? Rift Valley Province, Trans-Nzoia District; or Nyanza Province, North Kavirondo District: Mount Elgon, flowers purple, 2440 m., Oct.-Nov. 1930, *Lugard 40* (Herb. Kew., Herb. Mus. Brit.). ? Rift Valley Province, Nandi District; or Nyanza Province, North Kavirondo District: Nandi District, 1898, *A. Whyte C.* Second day from Nandi, 1898, *A. Whyte D3*. Central Province, ? District: Mount Kenya, 2440 m., Feb. 1914, *G. St. J. Orde Browne s.n.* (Herb. Mus. Brit.); ibid., 1899, *H. J. Mackinder s.n.* (Herb. Mus. Brit.); ibid., in forest with bamboo and trees, 3050 m., Oct. 1927, *W. Lyne Watt 1153*. Central Province, Kiambu District: Limuru, aromatic herb 30–60 cm. high, flowers purple, 2130 m., June 5, 1918, *Snowden 565* (Herb. Kew., Herb. Mus. Brit.); ibid., in grass and bushland, to 60 cm., flowers rose, 2130 m., Feb. 1915, *Dümmer 1652* (Herb. Kew., Herb. Mus. Brit.). Nyanza Province, Kericho District: Sotik, 1889, *F. J. Jackson s.n.* (Herb. Mus. Brit.); ibid., 1830 m., Oct. 31, 1932. *J. McDonald 2015*. Masai Province, Naivasha District: mau Forest, 1889, *F. J. Jackson s.n.* (Herb. Mus. Brit.). ? Province and District: Without locality, Feb. 2, 1907, *H. Powell 57*; *E. A. Mearns 2331* (Herb. Mus. Brit.); 1980–3050 m., herb, common on Aberdares and Kenia, *E. Battiscombe 550*.

TANGANYIKA TERRITORY: Northern Province, Moshi District: Above Marangu, 3200 m., Oct. 1893, *Volkens 1172* (Herb. Mus. Brit.). Bismarck Hill, Marangu, Kilimanjaro, 2000 m., Jan. 1, 1913, *Grote 3924*. Kilimanjaro, Maschame, 1520–1830 m., Aug. 1925, *Haarer 11/20/34* (2); ibid., above Rongai, Kimengalia stream, on grassy slope above upper scrub-forest, growing in thick grass, small herb, flowers mauve, 2440 m., Dec. 1, 1932, *C. G. Rogers 158* (Herb. Kew., Herb. Mus. Brit.); ibid., S.E. side, 2800 m., Jan. 13, 1934, *Schlieben 4543b* (Herb. Mus. Brit.); ibid., Bismarck Hill, among grasses in semi-shaded places in *Philippia excelsa-Hagenia abyssinica* woodland on rocks in mountain ravines at higher altitudes, range 2440–3350 m., a perennial mat-plant with purple flowers and sweetly scented leaves, 2895 m., Feb. 28, 1934, *Greenway 3918*; ibid., upper limit of temperate rain-forest, herb with purple inflorescence and salvia-like flowers and very strong and quite pleasant minty smell when crushed, up to 90–120 cm. high, leaves small and sessile, among the dominant plants, 2740–2875 m., Dec. 18, 1935, *R. G. Turrall 56*; ibid., comm. *W. F. Baldock 1*. Southern Highlands Province, Iringa District: E. Mufindi, on edge of secondary *Myrica-Macaranga* mist-forest in open parts of *Hyparrhenia-Dissotis* grassland patches, locally common, perennial laxly branched herb with pinkish-mauve flowers and strongly mint-scented leaves, 1890 m., Aug. 3, 1933, *Greenway 3462*. Rungwe District: Rungwe, June 27, 1913, *Stolz 1395* (Herb. Kew., Herb. Mus. Brit.). Kyimbila, flowers lilac-blue, 2000 m., Feb. 16, 1914, *Stolz 2523* (Herb. Kew., Herb. Mus. Brit.). ? District: Lower plateau N. of L. Nyasa, *Thomson s.n.*

NYASALAND: North Nyasa District: Nyika Plateau, common on grassy edges of forest, herb, stems to 80 cm. long, weak, reclining, leaves purplish, pennyroyal-scented, flowers pale purple, 2300 m., Aug. 13, 1946, *17200*.

Calamintha simensis f. *flaccida* Vatke, Linnaea **37**: 327 (1871–1873), based on *Schimper 721a* from Abyssinia, is possibly synonymous with *S. pseudosimensis*, but there are no corollas on the specimen at Kew. *S. pseudosimensis* has been wrongly interpreted as *Calamintha simensis* by very many authors, e.g. Baker in Thiselton-Dyer, Fl. Trop. Afr. **5**: 455 (1900), *pro majore parte*, and Robyns, Fl. Sperm. Parc Nat. Albert **2**: 163 (1947). In fact the genuine *S. simensis* has been twice distinguished from *S. pseudosimensis* and described as "new," with the wrong idea that *S. pseudosimensis* was the true *S. simensis*.

In true *S. simensis* the leaves are distinctly [2–5 (–9) mm.] petiolate, particularly noticeably on the flowering shoots, less broadly rounded or even cuneate at base, with the nerves not impressed above; the calyx is smaller, 3–5, rarely to 6 mm. long, with the lower teeth 1–2 mm. long; and, particularly at the throat, less hairy; and, very important, the posticous stamens are reduced to minute staminodes 0.4–0.75 mm. long. True *S. simensis* occurs in Abyssinia, and on the Ruwenzori range in Uganda and the Belgian Congo, also in Kigezi District of Uganda (*Purseglove 2826* in Herb. Kew.).

The following is the synonymy of *S. simensis*:

Satureja sinensis (Benth.) Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4^{3A}: 303. 1896; Ind. Kew. Suppl. **2**: 165. 1904.

Calamintha sinensis Benth. in DC. Prodr. **12**: 230. 1848; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 455. 1900, pro min. parte. [Based on *Schimper, Sect. 2, 999*, in Herb. Hook. now at Kew!]

Calamintha cryptantha Vatke, Linnaea **37**: 328. 1871–1873; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 455. 1900. (Based on *Schimper 722* ! and *1144*!)

Calamintha parvula S. Moore, Jour. Linn. Soc. Bot. **38**: 276. 1908. (Based on *Wollaston s.n.* from Ruwenzori, 3350 m., in Herb. Mus. Brit.!)

Calamintha cryptantha Vatke var. *mildbraedii* Perk. Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exp. 1907–1908 **2**: 551. 1913; Robyns, Fl. Sperm. Parc Nat. Albert **2**: 164. 1947. (Based on *Mildbraed 1634*, not seen; this var. being thus interpreted e. descr.)

I have not seen the type of *Calamintha simensis* var. *obtusifolia* Avetta, Ann. Ist. Bot. Roma **6**: 61 (1895), and do not know where to place it.

There is a good deal of variation in *S. simensis*. *C. cryptantha* seems to be a robust form with the calyx 3.5–4 mm. long, cleistogamous flowers and two small fertile stamens 0.5 mm. long.

Gillett 5360 from Abyssinia has apparently fully developed flowers and a calyx 4–5 mm. long. Hairiness varies a great deal. *Schimper 107* (1853) has very hairy calyces up to almost 7 mm. long and short petioles 1–2 mm. long; the leaves however resemble in texture those of *C. simensis*, and the stamen-structure is similar. It may be a hybrid.

Satureja uhligii Gürke, Bot. Jahrb. **36**: 128 (1905), based on *Uhlig 517* from the upper forest-limit, 2800 m., above Arusha, Tanganyika Territory, Nov. 1901 (thus presumably on Mount Meru), is described as having a corolla 12–13 mm. long. This is considerably longer than any of *S. pseudosimensis. S. uhligii* is probably a species akin to *Calamintha elgonensis* Bullock that occurs in Mbulu District, Tanganyika, and, I believe, hybridizes with *S. pseudosimensis.*

Scutellaria paucifolia Bak. Kew Bull. **1895**: 292. 1895; in Thiselton-Dyer, Fl. Trop. Afr. **5**: 462. 1900.

Scutellaria livingstonei Bak. Kew Bull. **1898**: 162. 1898; in Thiselton-Dyer, Fl. Trop. Afr. **5**: 462. 1900.

Kota-kota District: Chenga Hill, sporadic in low open *Brachystegia* woodland, perennial herb, rootstock large, woody, young shoots growing after burning of the grass, flowers dark purple, 1600 m., Sept. 9, 1946, *17591.* Widespread in the savannah regions of tropical Africa, but rarer in the W. and there only recorded from French Guinea and Nigeria.

Achyrospermum laterale Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 464. 1900; E. A. Bruce, Kew Bull. **1936**: 53. 1936.

Cholo District: Cholo Mountain, occasional in rain-forest undergrowth, shrub 2–2.5 m. high, erect, sparsely branched, more or less fleshy, 1400 m., Sept. 26, 1946, *17813.* Endemic to Nyasaland.

Stachys didymantha Brenan, sp. nov.

A *S. aethiopica* L., cui affinis, verticillastris bifloris et (*S. aethiopica* L. var. *hispidissima* Benth. excepta) indumento dense piloso-pubescenti differt; a *S. leptoclada* Briq., etiam cognata, habitu, calyce minore, corolla multo majore, et a *S. parili* N.E. Br., planta similis, calyce minore minus dense pubescenti, dentibus calycis quam tubum brevioribus apice minus spinescentibus recedit.

Herba usque ad 1 m. alta, adscendens vel subscandens. *Caules* usque ad 2 mm. diametro, tetragoni, crebre ramosi, virides vel purpurascentes, pilis plus minusve densis patentibus vel subdeflexis albidis 0.5–1 mm. longis vestiti, aliis brevioribus glanduliferis immixtis; internodia 1.5–8 cm. longa; *Folia* opposita, firme chartacea, ovato-cordata, (1–) 1.5–3 (–4.5) cm. longa, (0.8–) 1–2.5 (–2.8) cm. lata, apice obtusa vel nonnunquam subacuta, basi sinu aperto 1.5–4 (–6) mm. alto 4–15 mm. lato, margine crenata crenis 1–2 mm. altis 1.5–5 mm. inter se distantibus obtusis vel subobtusis, utrinque satis dense piloso-pubescentia, costa et nervis lateralibus utrinque 3–5 et venulis supra inconspicuis vel plerumque leviter impressis subtus prominulis; petiolus 0.5–1.5 (–2.5) cm. longus, ut caulis sed saepe densius vestitus. *Inflorescentiae* caules primarios vel ramos laterales terminantes; verticillastri 2–4 (–? 5), biflori, 0.5–1.5 (–2) cm. inter se distantes. *Bracteae* infimae foliis supremis similes, superiorae subito reductae, lanceolatae, acutae, integrae vel subintegrae, subsessiles, circiter 4–6 mm. longae, 1–2 mm. latae. *Flores* brevissime pedicellati; pedicelli 0.5–1 mm. longi, pubescentes. *Calyx* dentibus inclusis 5–6.5 mm. longus, extra dense pubescens pilis patulis vel paulum antice curvatis; tubus campanulatus, 10-nervius, intus glaber, 3.5–4 mm. longus; dentes 5, subaequales, anguste triangulares, acutae, 2–3 mm. longae, basi 1 mm. latae. *Corolla* alba, purpureo-maculata vel -striata; tubus circiter 8 mm. longus, basi 1.5 mm. diametro, apicem versus paulum ampliatus, extra inferne glaber, superne pilis glandulosis et eglandulosis breviter pubescens; labium superius valde concavo-convexum, breviter oblongo-obovatum, extra pubescens, intus glabrum, 3.5–4 mm. longum, 2 mm. altum (a latere visum) apice rotundatum, ciliolatum; labium inferius extra pubescens, intus glabrum, circiter 8–11 mm. longum, lobo medio subrotundato vel etiam paulum latiore quam longiore 4–6 mm. longo 5–8.5 mm. lato margine minute eroso apice leviter (usque ad 1 mm. alto) emarginato, lobis lateralibus breviter semiellipticis 0.7–2 mm. longis basi circiter

2 mm. latis deorsum divergentibus obtusis ciliolatis. *Stamina* 4, geminatim conniventia; filamenta circiter 4 mm. longa, inferne pubescentia, superne subsessiliter glandulosa; antherae siccitate caerulescentes, 1.5 mm. longae, circiter 0.5 mm. latae, thecis divaricatissimis. *Stylus* 8 mm. longus, glaber, apice breviter et subaequaliter bifidus, lobis triangulari-acutis. *Ovarium* glabrum. *Nuculae* ignotae.

Mlanje District: Mlanje Mountain, 1891, *A. Whyte s.n.* (Herb. Kew. sub *S. aethiopica*); ibid., Oct. 1891, *Whyte 20* (Herb. Mus. Brit.); southwest ridge, sprawling in shelter of a rock, herb, flowers white, lower lip blotched with purple, 2400 m., June 28, 1946, *16492*; Luchenya Plateau, gregarious locally in forest regrowths, herb about 1 m. high, subscandent in habit, flowers white, faintly streaked with purple, 1890 m., July 6, 1946, *16700*; ibid., gregarious in dense tangles amongst sheltering rocks on grasslands, herb 50–60 cm. high, ascending, leaves rugose, flowers white, flecked with purple, 2100 m., July 11, 1946, *16792* (TYPUS in Herb. Kew.).

This new species, apparently narrowly endemic to Mlanje Mountain, is a northern outlying representative of a complex of closely related Cape species. From *S. aethiopica*, to which it is apparently most closely related, it differs by its constantly 2-flowered verticillasters and dense indumentum, except that *S. aethiopica* var. *hispidissima* may have it as dense.

The distinctions between these species are very small, and perhaps no more than varietal, but if the South African relatives of *S. aethiopica* are treated as species then I think that the Nyasaland plant certainly has an equal claim. The South African species of *Stachys* have been revised by Skan in Thiselton-Dyer, Fl. Cap. **5**^{1}: 336–367 (1910).

Leucas milanjiana Gürke, Bot. Jahrb. **22**: 141. 1895; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 478. 1900.

Zomba District: Zomba Plateau, common on roadsides in *Brachystegia* woodlands, perennial herb 30–50 cm. high, stems several, ascending from a thick woody stock, flowers white, 1500 m., June 4, 1946, *16213*. Portuguese East Africa, Nyasaland, N. and S. Rhodesia.

Leucas nyassae Gürke, Bot. Jahrb. **22**: 137. 1895; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 485. 1900.

? *Leucas villosa* Gürke, Bot. Jahrb. **22**: 137. 1895; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 484. 1900, at least as to the specimen collected by Whyte in Nyasaland.
Leucas megasphaera Bak. Kew Bull. **1898**: 163. 1898; in Thiselton-Dyer, Fl. Trop. Afr. **5**: 488. 1900.
Leucas randii S. Moore, Jour. Bot. **38**: 464. 1900.

Blantyre District: Blantyre, in *Brachystegia* woodlands, herb 20–50 cm. high, aromatic, leaves pale green, flowers white, 1100 m., June 18, 1946, *16359*. Kotakota District: Nchisi, occasional on formerly cultivated ground in *Brachystegia* woodlands, herb with several reclining and ascending stems about 80 cm. long, flowers dry, colour not ascertainable, 1350 m., Aug. 1, 1946, *17075*. Tanganyika Territory, N. and S. Rhodesia, and Nyasaland.

The type of *L. villosa* (*Stuhlmann 8412* from Ukwere, Tanganyika Territory) is now no longer extant, and nothing exactly matching seems to have been collected in that region since. When *L. villosa* and *L. nyassae* are combined I therefore choose *L. nyassae* as the name, type-gatherings of which (*Buchanan 255*, *460*) are in Herb. Kew. The type-specimen of *L. randii* (*Rand 522*, from Salisbury, S. Rhodesia) I have examined in Herb. Mus. Brit.

Leonotis leonurus (L.) Ait. f. Hort. Kew. ed. 2. **3**: 410. 1811; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 492. 1900, excl. *Whyte 320*; R. A. Dyer, Fl. S. Afr. **22**: *pl. 876*. 1942.

Phlomis leonurus L. Sp. Pl. 587. 1753.

North Nyasa District: Nyika Plateau, common on edges of juniper forest, shrub 3–8 m. tall, freely branched, branches erect, flowers orange-red, 2250 m., Aug. 11, 1946, *17152*. Belgian Congo ? (fide Briquet and Baker) and N. Rhodesia to South Africa; new to Nyasaland (*Whyte 320* cited in Fl. Trop. Afr. is not *L. leonurus*).

Brass 17152 is, e descr., var. *vestita* Briq. Bot. Jahrb. **19**: 194 (1894), based on a specimen from the Congo (*Pogge 360*) which I have not seen. Briquet's description runs: "Caule densissime piloso, foliis subtus dense pubescentibus, cinereis, ± tomentellis."

Leonotis mollissima Gürke, Bot. Jahrb. **22**: 141. 1895; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 493. 1900.

Leonotis melleri Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 491. 1900.

Zomba District: Zomba Plateau, occasional on open roadsides, herb up to 2 m. high, branches few, erect, leaves grey beneath, flowers brownish-orange, 1450 m., June 5, 1946, *16259*. Kota-kota District: Nchisi, occasional in gullies in *Brachystegia* woodlands, herb 1.5–2 m. high, stems erect, simple or sparsely branched, flowers pale brownish-yellow, 1350 m., Aug. 1, 1946, *17084*; ibid., occasional in gullies in *Brachystegia* woodland, herb 1.5–2 m. high, stems erect, simple or sparingly branched, flowers orange-brown, 1350 m., Aug. 1, 1946, *17085*. Tanganyika Territory, southwards to Angola.

I cannot distinguish *L. melleri* from *L. mollissima*. In the key to the species of *Leonurus* by Baker in Fl. Trop. Afr. **5**: 490 (1900) *L. melleri* is separated from its relatives by having white flowers, but on the label of Meller's type-specimen the flowers are described as light yellow! In fact the colour of the flowers of *L. mollissima* is quite remarkably variable, from reddish-orange, orange, yellow, yellow-buff, and mixed shades of yellow and brown to pink and white. Gürke (Bot. Jahrb. **22**: 142. 1895) restricts typical *L. mollissima* to plants with brick-red flowers, and makes two varieties, var. *carnea* Gürke, with flesh-coloured flowers, and var. *fulva* Gürke, with fulvous flowers. *Brass 16259* no doubt would come under var. *fulva*. If one accepts Gürke's varieties then, logically, a number of other shades must also be appropriately christened. But until we know more about why and how these colour-forms occur I doubt if further varietal names will make things clearer.

Leonotis decadonta Gürke, Bot. Jahrb. **22**: 144. 1895; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **5**: 493. 1900.

Cholo District: Cholo Mountain, common locally in rain-forest regrowths, shrub 2–4 m. high, robust, a showy species, flowers orange-red, 1200 m., Sept. 22, 1946, *17749*. Confined to Nyasaland.

ILLECEBRACEAE

Corrigiola drymarioides Bak. f. Jour. Linn. Soc. Bot. **40**: 181. 1911.

Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional in forest regrowths, herb, branches spreading and sprawling on ground, flowers white, 1850 m., July 1, 1946, *16573*.

A very interesting find of a plant previously known only from Swynnerton's type-collection made in the Chimanimani Mountains in S. Rhodesia.

AMARANTHACEAE[50]

Celosia trigyna L. Mant. Pl. Alt. 212. 1771.

Kota-kota District: Benga, west shore of Lake Nyasa, on sandy beaches, herb 30–50 cm. high, flowers pink, 470 m., Sept. 2, 1946, *17500*. Chikwawa District:

Lower Mwanza River, frequent on sandy beaches, herb, flowers white, 180 m., Oct. 3, 1946, *17933*. Tropical Africa, widespread; also Madagascar, Comoro Islands, and Arabia.

Both the above specimens are annotated by Dr. Suessenguth as a form with oblong-lanceolate leaves.

Celosia loandensis Bak. Kew Bull. **1897**: 277. 1897.

Chikwawa District: Chikwawa, one example in dry brushy forest of elevated river-plain, ascending herb 60 cm. high, flowers white, 200 m., Oct. 2, 1946, *17893*. Belgian Congo, N. Rhodesia, Angola, and now found for the first time in Nyasaland.

Cyathula uncinulata (Schrad.) Schinz in De Wild. Pl. Bequaert. **5**: 386. 1932.

Achyranthes uncinulata Schrad. Ind. Sem. Hort. Goett. 1. 1833. (Reference from Schinz, l.c., and Ind. Kew.)

Kota-kota District: Nchisi Mountain, scrambling on forest borders, shrub 2–3 m. high, flowers greenish, 1500 m., July 29, 1946, *17025*. Cholo District: Cholo Mountain, occasional in rain-forest regrowths, scrambling shrub 3–5 m. high, 1200 m., Sept. 20, 1946, *17711*. Widespread in East Africa, extending south to the Transvaal.

Cyathula cylindrica Moq. in DC. Prodr. **13^2**: 328. 1849.

Mlanje District: Mlanje Mountain; Likubula-Tuchila Divide, occasional on forest paths, scrambling, more or less fleshy shrub, flowers greenish, 2000 m., July 9, 1946, *16752*. Kota-kota District: Nchisi Mountain, abundant on shrubby margins of rain-forest, shrub 2 m. high, scrambling, much branched, flowers green, filaments yellow, 1600 m., July 31, 1946, *17060*. Anglo-Egyptian Sudan to South Africa and Madagascar.

Cyathula cf. **mannii** Bak. Kew Bull. **1897**: 278. 1897.

Zomba District: Zomba Plateau, plentiful in rain-forest regrowth, shrub 2–3 m. high, large, scrambling, somewhat fleshy, flowers green, 1450 m., June 5, 1946, *16265*. British Cameroons, Fernando Po, Kenya, and Nyasaland.

Dr. Suessenguth writes "vix discernenda a *C. cylindrica* Moq."

Aerva leucura Moq. in DC. Prodr. **13^2**: 302. 1849.

Chikwawa District: Chikwawa, by roadsides in *Acacia albida* woodland, herb 80–100 cm. high, flowers green, 200 m., Oct. 3, 1946, *17918*. Uganda to South Africa.

Achyranthes aspera L. Sp. Pl. 204 (1753) var. **aspera** f. **rubella** Suesseng. Bull. Jard. Bot. Brux. **15**: 56. 1938.

Cholo District: Cholo Mountain, frequent in rain-forest regrowth, subscandent herb 1–3 m. high, inflorescence purplish-pink, 1200 m., Sept. 21, 1946, *17708*. The species widespread in the tropics of the Old World; also found in the New World (? introduced); the form rare in Africa (Anglo-Egyptian Sudan and Ruanda-Urundi) and not apparently recorded previously for Nyasaland.

Achyranthes bidentata Blume, Bijdr. Fl. Nederl. Ind. 545. 1825.

Cholo District: Cholo Mountain, abundant in primary rain-forest, shrub up to 2 m. high, stamens and pistil red, 1300 m., Sept. 20, 1946, *17661*. Tropics of the Old World, but, although widespread in tropical Africa, apparently very local and confined to forest-zones.

BASELLACEAE

Basella alba L. Sp. Pl. 272. 1753; Bak. & C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. **6^1**: 94. 1909; Hauman, Fl. Congo Belge **2**: 129. 1951.

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[50] All determinations by Dr. K. Suessenguth, Munich.

Cholo District: Cholo Mountain, in second-growth rain-forest, twining vine 8 m. high, plant very fleshy, flowers white, fruit green, 1200 m., Sept. 22, 1946, *17741*. Pantropical, but apparently new to Nyasaland.

PHYTOLACCACEAE

Phytolacca dodecandra L'Hérit. Stirp. Nov. 143. *pl.* 69. 1791; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. 6^1: 97. 1909; H. Walt. Pflanzenreich 39(4^{83}): 42. 1909; Balle, Fl. Congo Belge **2**: 94. 1951.

Kota-kota District: Nchisi Mountain, in primary rain-forest, large scandent shrub 10 m. high, leaves fleshy, flowers greenish, 1500 m., July 29, 1946, *17016*. Widespread in tropical Africa, extending to Madagascar and Natal.

POLYGONACEAE

Polygonum plebeium R. Br. Prodr. Fl. Nov. Holl. 420. 1810; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. 6^1: 105. 1909; Robyns, Fl. Congo Belge **1**: 410. 1948.

Kasungu District: Kasungu, in disturbed ground in *Brachystegia* woodland, flowers pink, 1000 m., Aug. 24, 1946, *17409*; ibid., plentiful in moist sandy bed of a stream, herb, branches prostrate on sand, flowers pink, 1000 m., Aug. 28, 1946, *17447*. Tropical and subtropical regions of the Old World.

Polygonum salicifolium Brouss. ex Willd. Enum. Pl. Hort. Berol. 428. 1809; Robyns, Fl. Congo Belge **1**: 413. 1948.

Polygonum serrulatum Lag. Gen. & Sp. Pl. Nov. 14. 1816; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. 6^1: 107. 1909.

Kota-kota District: Benga, W. shore of Lake Nyasa, on sandy beach, herb 50 cm. high, stem red, flowers pink, 470 m., Sept. 2, 1946, *17493**. Cholo District: Nswadzi River, common on grassy beaches, ascending herb 60–70 cm. high, flowers pink, native name kovani, 840 m., Sept. 27, 1946, *17849*. Widespread in the tropics and subtropics.

Polygonum nyikense Bak. Kew Bull. **1897**: 280. 1897.

Polygonum mildbraedii Dammer in Mildbr. Wiss. Ergebn. Deutsch-Zentr.-Afr.-Exp. 1907–1908 **2**: 202. 1911; Robyns, Fl. Spermat. Parc Nat. Albert **1**: 120. *pl. 10*. 1948; Fl. Congo Belge **1**: 418. 1948.

Cholo District: Nswadzi River, gregarious on grassy beaches, herb about 1 m. high, flowers white, native name (Chinyanja) kovani, 840 m., Sept. 27, 1946, *17846*. Fernando Po, Anglo-Egyptian Sudan (Imatong Mts.), Belgian Congo, Uganda, Kenya, Tanganyika Territory, Nyasaland, and S. Rhodesia.

Frequently confused with *P. acuminatum* H.B.K. For the differences between the two species see Robyns (ll.c.)

Rumex abyssinicus Jacq. Hort. Vindob. 3: 48. *pl. 93*. 1776; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. 6^1: 114. 1909; Robyns, Fl. Congo Belge **1**: 398. 1948.

Zomba District: Zomba Plateau, occasional in bushy rain-forest regrowths, herb 1 m. high or more, plant fleshy, several stems erect from a common base, flowers green, 1400 m., June 11, 1946, *16330*. Widespread in E. tropical Africa, extending westwards to Nigeria and the British Cameroons.

Rumex bequaerti De Wild. Pl. Bequaert. **5**: 2(1929) var. **quarrei** (De Wild.) Robyns, Fl. Spermat, Parc Nat. Albert **1**: 117. 1948; Fl. Congo Belge **1**: 401. 1948.

Rumex quarrei De Wild. Pl. Bequaert. **5**: 3. 1929.

Cholo District: Cholo Mountain, frequent in wet situations in rain-forest regrowths, perennial herb about 1 m., leaves eaten by the natives, native name

(Chinyanja) naindajera, 1200 m., Sept. 26, 1946, *17820*. The species and the variety widespread in the mountains of eastern and central Africa, extending westwards to the British Cameroons.

Dr. K. H. Rechinger, to whom I am very grateful for examining this specimen, writes that it is not possible to reach a final decision at present about the treatment of the African representatives of *R. nepalensis*. "So I think it will be best to enumerate *Brass 17820* under the provisional name *R. bequaerti* De Wild. var. *quarrei* (De Wild.) Robyns as proposed by you, which is certainly correct. The question still open is whether *quarrei* should be treated as an independent species, a subspecies or a variety. When I described *R. camptodon* in 1932 [Beih. Bot. Centralbl. **49**^{2}: 76] I did not know *R. bequaerti* De Wild., 1929, and, if *R. bequaerti* is accepted in a broader limitation, *R. camptodon* has to be regarded as a synonym."

PODOSTEMACEAE[51]

Sphaerothylax wageri G. Taylor, Jour. Bot. **76**: 112. 1938.

Zomba District: Zomba Plateau, abundant on wet rocks of a waterfall, herb 3–6 cm. high, more or less fleshy, green or reddish, 1200 m., May 26, 1946, *16036*; ibid., covering wet rocks of a cascade in rain-forest, herb 5–10 cm. high, fleshy, brownish-red, thallus branched, green, branches 1.5–2 mm. wide, too closely attached to rocks to be collected, 1500 m., June 7, 1946, *16301*. Southeast tropical Africa, from southern Tanganyika Territory through Nyasaland and N. and S. Rhodesia, and extending beyond the tropics to the Lydenburg District of the Transvaal.

HYDROSTACHYACEAE[51]

Hydrostachys polymorpha Klotzsch in Peters, Reise Mossamb. Bot. 506. *pl.* 53. 1863.

Cholo District: East slopes of Cholo Mountain, Nswadzi River, plentiful on rocks in running water, herb, branches 60–90 cm. long, totally submerged and streaming in the water, plant green, fleshy, sterile, 840 m., Sept. 18, 1946, *17642*. Nswadzi River, plentiful on rocks in fast-running water, herb, submerged except for erect spikes, base of stems reddish, 840 m., Sept. 27, 1946, *17841*; ibid., on rocks in fast-running river, 840 m., Sept. 29, 1946, *17863**. Southeast tropical Africa: Portuguese East Africa, Nyasaland, and the neighbouring regions of N. and S. Rhodesia.

PIPERACEAE

Piper capense L. f. Suppl. Pl. 90. 1781; Balle, Bull. Jard. Bot. Brux. **16**: 370. 1942.

Kota-kota District: Nchisi Mountain, frequent in moist gullies in rain-forest, shrub 2 m. high, pungently aromatic, flower-spikes white, fruit green, 1550 m., July 30, 1946, *17041*. North Nyasa District: Nyika Plateau, frequent in montane forest undergrowth, shrub 2–3 m. high, leaf-nerves reddish-brown beneath, fruit green, 2250 m., Aug. 16, 1946, *17259*. Cholo District: Cholo Mountain, abundant in rain-forest undergrowth, shrub 2–4 m. high, aromatic, flower-spikes white, fruit green, 1200 m., Sept. 24, 1946, *17781*. Widespread particularly in the mountainous regions of tropical Africa.

Piper brachyrhachis C. H. Wright in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 147. 1909; Balle, Bull. Jard. Bot. Brux. **16**: 373. 1942.

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[51] By Dr. G. Taylor, British Museum (Natural History).

Kota-kota District: Nchisi Mountain, common in more or less swampy forest in gullies, shrub 1.5–2 m. high, pleasantly aromatic, leaves grey beneath, flower-spikes white, fruit watery white when ripe, 1400 m., July 25, 1946, *16937*. Nyasaland, N. Rhodesia, and Belgian Congo (Haut-Katanga).

Peperomia retusa (L. f.) A. Dietr. Sp. Pl. 155. 1831.

Piper retusum L. f. Suppl. Pl. 91. 1781.

Peperomia mannii sensu Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. 6^1: 153. 1909, quoad spec. nyas.; non *P. mannii* Hook. f. ex C.DC.

North Nyasa District: Nyika Plateau, gregarious on lower trunk of a tree in montane forest, herb 10–15 cm. high, aromatic, leaves pale beneath, not very fleshy, flower-spikes green, 2250 m., Aug. 16, 1946, *17239*. Uganda to South Africa.

I am unable to see any sufficient reason for retaining the Nyasaland specimens that were referred by Baker and Wright in the *Flora of tropical Africa* to *P. mannii* separate from the S. African *P. retusa*. Probably, though I have not seen authentic material, *P. ulugurensis* Engl. is a further synonym; whether the wide view of *P. ulugurensis* taken by Balle (Bull. Jard. Bot. Brux. **16**: 390 et seq. 1942) is justified, is another matter.

The real *P. mannii* Hook. f. ex C. DC., of the Cameroon Mountain, Fernando Po, and possibly the lowland rain-forest of S. Nigeria, seems to be a distinct species, though no doubt a close ally, differing in the pubescent and more trailing stems, simple flowering shoots, and more regularly elliptical to suborbicular upper leaves.

Peperomia abyssinica Miq. Lond. Jour. Bot. **4**: 419. 1845.

Kota-kota District: Nchisi Mountain, gregarious on shady rocks in *Brachystegia* woodland, herb 15–25 cm. high, slightly pungent in taste, not aromatic, very fleshy, leaves reflexed on petioles, flower-spikes pale green, 1550 m., July 26, 1946, *16962*. Eritrea to Uganda; new to Nyasaland.

The plant described by Balle as *P. abyssinica* (Bull. Jard. Bot. Brux. **16**: 396. 1942) seems to be something different.

Peperomia goetzeana Engl. Bot. Jahrb. **28**: 375. 1900; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. 6^1: 152. 1909.

North Nyasa District: Nyika Plateau, epiphytic in montane forest, aromatic herb, leaves thick and fleshy, flower-spikes green, 2350 m., Aug. 17, 1946, *17283*. Uganda, Kenya, Tanganyika Territory, and Nyasaland.

I have not seen authentic material of this plant, but I have compared Mr. Brass' specimen with plants from the type-locality of *P. goetzeana* in Tanganyika Territory which agree with the original description. *P. goetzeana* is perhaps no more than a variety of *P. abyssinica* with broader, blunter, and more obovate leaves, but on present evidence I would keep it distinct.

Peperomia rotundifolia (L.) H.B.K. Nov. Gen. & Sp. **1**: 65. 1815; Trel. & Yunck. Piper. N. S. Am. 622. 1950.

Piper rotundifolium L. Sp. Pl. 30. 1753.

Peperomia bagroana [errore "bangroana"] C.DC. Jour. Bot. **4**: 134. 1866; Balle, Bull. Jard. Bot. Brux. **16**: 388. 1942.

Zomba District: Zomba Plateau, occasional epiphyte creeping on trees overhanging a stream, herb, leaves thick and fleshy, somewhat lenticular, flower-spikes green, 1400 m., May 28, 1946, *16045*. Widely spread in tropical Africa; also reported from Madagascar and the Comoro Islands (fide Balle, op. cit.).

I cannot distinguish the African plant from the widespread tropical American *P. rotundifolia.*

Peperomia reflexa (L.f.) A. Dietr. Sp. Pl. **1**: 180. 1831; Balle, Bull. Jard. Bot. Brux. **16**: 383. 1942.

Piper reflexum L.f. Suppl. Pl. 91. 1781.

Zomba District: Zomba Plateau, epiphytic on a tree overhanging a stream, only 3 plants seen, suberect herb, leaves thick and fleshy, spikes green, 1400 m., May 28, 1946, *16047**; ibid., occasional epiphyte in riverine rain-forest, leaves thick and fleshy, obscurely 3-nerved, 1450 m., June 3, 1946, *16174*. North Nyasa District: Nyika Plateau, on upper branches of trees in juniper forest, leaves concave, not very thick, slightly aromatic, 2250 m., Aug. 11, 1946, *17157**. Cholo District: Cholo Mountain, epiphytic high on rain-forest trees, herb, leaves thick and fleshy, plant slightly aromatic, flower-spikes green, 1350 m., Sept. 20, 1946, *17682**; ibid., low epiphyte in rain-forest, herb slightly aromatic, leaves thick and fleshy, flower-spikes green, 1350 m., Sept. 20, 1946, *17683**. Pantropical.

LAURACEAE

Cassytha filiformis L. Sp. Pl. 35. 1753; Stapf in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 188. 1909; Robyns & Wilczek, Fl. Congo Belge **2**: 443. *pl. 43*. 1951.

Kota-kota District: Nchisi Mountain, parasitic on trees on forest edges, flowers white, 1400 m., July 25, 1946, *16945*. Nchisi, occasional on shrubs in *Brachystegia* woodland, vine, flowers white, fruit red at maturity, 1350 m., Aug. 1, 1946, *17089*. Pantropical.

PROTEACEAE[52]

Protea gaguedi J. F. Gmel. Syst. **2**: 225. 1791.

Protea abyssinica Willd. Sp. Pl. **1**: 522. 1798; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 199. 1910; Hauman, Bull. Jard. Bot. Brux. **17**: 173. 1944.

Zomba District: Zomba Plateau, locally common in *Brachystegia* woodlands, tree 3–6 m. high, leaves slightly glaucous, flowers not seen, 1500 m., June 4, 1946, *16217*. In eastern Africa from the Anglo-Egyptian Sudan southwards to South Africa.

Protea bella Hauman, Bull. Jard. Bot. Brux. **17**: 170. 1944.

Kota-kota District: Nchisi Mountain, sporadic in *Brachystegia* woodlands, tree 8–10 m. high, branches few, upright, leaves more or less glaucous, perianth cream with pinkish tip, style pinkish, bracts red, bracts and flowers reflexed, 1400 m., Aug. 4, 1946, *17125*. Nyasaland and southwestern Tanganyika Territory.

Protea nyasae Rendle, Trans. Linn. Soc. II. Bot. **4**: 39. 1894; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 198. 1910; Hauman, Bull. Jard. Bot. Brux. **17**: 175. 1944.

Mlanje District: Mlanje Mountain, west slopes, common on grassy slopes, tree or shrub up to 4 m. high, leaves more or less glaucous, flowers white, about 1830 m., July 10, 1946, *Vernay 16773*. Endemic to Nyasaland.

Vernay 16773 has been compared with the type-specimen in the Herbarium of the British Museum (Natural History), collected by Whyte on Mlanje Mountain.

Protea kingaënsis ("hingaensis") Engl. Bot. Jahrb. **30**: 297. 1901; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 206. 1910; Hauman, Bull. Jard. Bot. Brux. **17**: 176. 1944.

North Nyasa District: Nyika Plateau, common locally in open grasslands, shrub 30–50 cm. high, clumps of several stems erect from a large stock, leaves bluish-green, flowers cream-coloured, bracts yellowish-green tipped with brown,

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[52] By R. D. Meikle & J. P. M. Brenan, Royal Botanic Gardens, Kew.

2300 m., Aug. 13, 1946, *17197*; ibid., common locally in open grasslands, often gregarious, shrub 3–5 dm. high, flowers cream-coloured, bracts yellowish-brown with brown tips, 2300 m., Aug. 16, 1946, *17261*. Tanganyika Territory, and now new to Nyasaland.

Brass 17261 was named by Prof. L. Hauman, of Brussels.

Protea madiensis Oliv. Trans. Linn. Soc. **29**: 143. *pl.* 92. 1875; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 204. 1910; Hauman, Bull. Jard. Bot. Brux. **17**: 176. 1944.

Zomba District: Zomba Plateau, plentiful in *Brachystegia* woodlands, tree or shrub 2–4 m. high, low, crooked, usually gregarious, leaves coriaceous, more or less glaucous, flower-heads very showy, flowers white, bracts concave, apex red below, 1430 m., May 30, 1946, *16084*. North Nyasa District: Nyika Plateau; Nchena-chena Spur, common in grasslands, tree or shrub 1.5–4 m. high, flowers white, 1850 m., Aug. 20, 1946, *17362*. Kota-kota District: Chia area, occasional in dry sandy woodlands of lake-plain, tree 4–6 m. high, flowers white, 480 m., Sept. 6, 1946, 17552; ibid., occasional in dry woodlands of lake-plain, tree 3–5 m. high, flowers white, bracts pinkish or reddish at apex, 480 m., Sept. 7, 1946, *17567*. Anglo-Egyptian Sudan, southwards on the eastern side of Africa to Portuguese East Africa, Nyasaland, and N. Rhodesia.

Brass 17362 has the leaves hairy beneath, and therefore approaches *P. madiensis* Oliv. var. *pilosa* (Engl.) Hauman, Fl. Congo Belge **1**: 246 1948; *P. madiensis* Oliv. f. *pilosa* Engl. Bot. Jahrb. **33**: 130. 1902), but the bracts are not by any means hairy all over.

Brass 17567 has bracts silkier outside than usual and suggests *P. bequaerti* De Wild. Repert. Sp. Nov. **1**: 542 (1913; see also Hauman, Fl. Congo Belge **1**: 244. 1948). While we have seen insufficient specimens of *P. bequaerti* to judge of its distinctness, we are certainly unwilling to separate *Brass 17567* specifically from *P. madiensis*.

Faurea forficuliflora Bak. Jour. Linn. Soc. Bot. **20**: 243. 1883.

Faurea racemosa Farmar, Kew Bull. **1908**: 58. 1908; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 208. 1910.

Mlanje District: Mlanje Mountain; west slope, on bank of a grassland stream, 4 m. high, branches and petioles purple, 1370 m., June 21, 1946, *16396*; Luchenya Plateau, frequent in forest of gullies, tree up to 10 m. high, flowers reddish, 2180 m., July 3, 1946, *16640*; ibid., occasional in secondary forest, tree about 4–6 m. high, compact and shapely, leaf-margins undulate, in fruit only, 1890 m., July 8, 1946, *16735*. Portuguese East Africa, Nyasaland, S. Rhodesia; also in Madagascar.

We are unable to separate the above two species.

Faurea saligna Harv. Lond. Jour. Bot. **6**: 373. *pl. 15*. 1847; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 209. 1910; Hauman, Fl. Congo Belge **1**: 230. 1948.

Kota-kota District: Nchisi Mountain, common in *Brachystegia* woodland, tree to 10 m. tall and 30 cm. in diameter, leaves more or less glaucous, petioles red, flowers greenish-brown, sweet-scented, 1400 m., Aug. 5, 1946, *17132*. In eastern Africa extending from Uganda southwards to the Transvaal and Natal; also in Nigeria and Angola.

Faurea speciosa Welw. Trans. Linn. Soc. **27**: 63. *pl. 20*. 1869; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 211. 1910; Hauman, Fl. Congo Belge **1**: 232. 1948.

Faurea decipiens C. H. Wright, Kew Bull. **1909**: 328. 1909; Bak. & Wright in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 210. 1910.

Zomba District: Zomba Plateau, frequent in *Brachystegia* woodlands, tree 3–7 m. high, leaf-nerves whitish, perianth greenish-yellow, reddish at base and apex, 1500 m., June 4, 1946, *16211*; ibid., frequent in *Brachystegia* woodlands, tree up to 7 m. high, leaf-veins pale above, obscure beneath, flowers reddish, 1500 m., June 4, 1946, *16219*. Dedza District: Dedza, occasional in *Brachystegia* woodland, tree 5–6 m. high, flowers yellowish-brown, 1550 m., July 23, 1946, *16882*. Kota-kota District: Nchisi Mountain, in *Brachystegia* woodland, tree 5–8 m. high, frequent, leaves pale green above, greyish beneath, flowers brownish-yellow, 1400 m., July 24, 1946, *16916*. Chia area, in dry woodland of a stony ridge on lake-plain, tree 12 m. high, leaves smooth and shining above, dull beneath, flowers brownish-pink, 480 m., Sept. 6, 1946, *17550*. In eastern Africa extending from the Anglo-Egyptian Sudan southwards to the Transvaal; in western Africa in Nigeria, the French Cameroons, and Angola.

THYMELAEACEAE

Arthrosolen chrysanthus Solms-Laub. in Schweinf. Beitr. Fl. Aethiop. 165 (1867) var. **igneus** (Gilg) H.H.W. Pearson in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 235. 1910.

Gnidia ignea Gilg, Bot. Jahrb. **19**: 258. 1894.

Gnidia chrysantha (Solms-Laub.) Gilg var. *ignea* (Gilg) Staner, Bull. Jard. Bot. Brux. **13**: 365. 1935.

Kota-kota District: Kota-kota, in dry ground near swamps, flowers red, 460 m., Aug. 1946, *Vernay 17403**. The species widespread in tropical Africa, the variety rarer and not yet recorded for W. Africa.

Gnidia buchananii Gilg, Bot. Jahrb. **19**: 261. 1894; H.H.W. Pearson in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 219. 1910; Staner, Bull. Jard. Bot. Brux. **13**: 348. 1935.

Kota-kota District: Nchisi, open ground in *Brachystegia* woodland, herb about 30 cm. high, flowers yellow, involucre red, 1400 m., Sept. 8, 1946, *Vernay 17568*; ibid., common locally in *Brachystegia* woodlands, bushy shrub 30–50 cm. high, stems numerous, erect from a thick rootstock, young shoots flowering after burning of the grass a month ago, flowers yellow, involucre red, 1350 m., Sept. 8, 1946, *17571*. Uganda to Angola.

Lasiosiphon glaucus Fres. Flora **21**: 603. 1838; H.H.W. Pearson in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 230. 1910.

Gnidia glauca (Fres.) Gilg, Bot. Jahrb. **19**: 265. 1894; Staner, Bull. Jard. Bot. Brux. **13**: 359. 1935.

North Nyasa District: Nyika Plateau, common on edges of juniper-forest, tree 4–7 m. high, flowers greenish-yellow, fragrant, bracts cream-coloured, 2250 m., Aug. 11, 1946, *17181*. Anglo-Egyptian Sudan, southwards to Nyasaland; also in the British Cameroons.

Lasiosiphon kraussianus (Meisn.) Burtt Davy, Man. Fl. Pl. Transv. **1**: 207. 1926; Hutch. & Dalz. Fl. W. Trop. Afr. **1**: 151. 1927.

Gnidia kraussiana Meisn. Lond. Jour. Bot. **2**: 552. 1843; Staner, Bull. Jard. Bot. Brux. **13**: 360. 1935.

Lasiosiphon kraussii Meisn. in DC. Prodr. **14**: 596. 1857; H.H.W. Pearson in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 231, 1910.

Kota-kota District: Chintembwe, common in rocky grassland, perennial herb 25–30 cm. high, many stems forming bushy clumps, young shoots flowering after burning of the grass, flowers yellow, involucre green, 1400 m., Sept. 9, 1946, *17580*. Dedza District: Dedza, occasional in *Brachystegia* woodlands, bushy shrub 30–40 cm. high, young shoots flowering after the burning of the grass, many stems from a thick woody stock, flowers yellow, 1500 m., Sept. 13, 1946, *17635*. French Guinea and the Anglo-Egyptian Sudan, southwards to South Africa.

Peddiea fischeri Engl. Hochgebirgsfl. Trop. Afr. (Abh. Preuss. Akad. Wiss. Berl. **1891**:) 310. 1892; Staner, Bull. Jard. Bot. Brux. **13**: 337. 1935.

Kota-kota District: Nchisi Mountain, frequent on edges of rain-forest, tree 5–6 m. high, compact and shapely, leaves paler beneath, smooth and shining, flowers green, tinged with red, 1650 m., July 31, 1946, *17052*. Cholo District: Cholo Mountain, common in rain-forest undergrowth, tree 3–5 m. high, flowers green, fruits ovoid, fleshy, black when ripe, about 1.5 cm. long and 1 cm. wide, 1300 m., Sept. 20, 1946, *17685*; ibid., common in rain-forest undergrowth, tree 5–6 m. high, flowers green, 1200 m., Sept. 25, 1946, *17799*. Widespread in tropical Africa.

LORANTHACEAE

Loranthus kalachariensis Schinz, Bull. Herb. Boiss. **4** (append. 3): 53. 1896; Sprague in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 280. 1910.

Kota-kota District: Nchisi, parasitic on *Albizzia* ? sp., shrub 1.5 m. tall, branches drooping, perianth-tube pink, segments red, stamens and style red, native name (Chinyanja) kalisagi, 1100 m., Aug. 3, 1946, *17115*. Portuguese East Africa, Nyasaland, S. Rhodesia, Angola, Bechuanaland, Southwest Africa.

Loranthus braunii Engl. Bot. Jahrb. **20**: 93. 1894; Sprague in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 303. 1910; Balle, Fl. Congo Belge **1**: 369. 1948.

Loranthus mweroënsis Bak. Kew Bull. **1895**: 292. 1895; Sprague in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 304. 1910.

Kota-kota District: Nchisi Mountain, in *Brachystegia* woodland, parasitic shrub 80 cm. high, flowers red (buds only), 1500 m., Aug. 3, 1946, *Anthony 17124*; ibid., on *Faurea* sp. in *Brachystegia* woodland, shrub 1 m. tall, branches few, leaves yellowish-green, thick and fleshy, flowers red, 1350 m., Aug. 5, 1946, *17130*. In W. Africa from the Gold Coast to Angola, extending eastwards to the Belgian Congo, Uganda, N. and S. Rhodesia, and Nyasaland, for which this is the first record.

I am content to follow Balle (l.c.) in considering *L. mweroënsis* Bak., to which both the above specimens might be referred, as merely a local variant of the widespread *L. braunii*.

Loranthus dregei Eckl. & Zeyh. Enum. Pl. Afr. Austr. 358 (1837) var. **taborensis** (Engl.) Sprague in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 312. 1910.

Loranthus taborensis Engl. Bot. Jahrb. **20**: 106. 1894.

Blantyre District: Blantyre, parasitic on various trees in *Brachystegia* woodlands, shrub about 1 m. high, stout, much branched, leaves somewhat fleshy, stellate-hairy, flowers greenish-yellow, showy, 1100 m., June 17, 1946, *16336*. Kota-kota District: Nchisi, on a variety of host-trees in woodlands, shrub 1.5 m. tall, leaf-nerves very prominent above, less so beneath, flowers greenish-yellow, in leaf-axils and on the old wood, native name (Chinyanja) kalisagi, 1100 m., Aug. 3, 1946, *17117*. The variety in the Belgian Congo, Tanganyika Territory, Nyasaland, and N. Rhodesia.

Loranthus dregei Eckl. & Zeyh. var. **sodenii** Engl. Bot. Jahrb. **20**: 105. 1894; Sprague in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 313. 1910.

Chikwawa District: Chikwawa, on *Acacia* sp., shrub, branches few, pendent, about 1 m. long, flower-tube orange, lobes green, 200 m., Oct. 4, 1946, *17940*. The variety in Kenya, Tanganyika Territory, Zanzibar, Portuguese East Africa, and Nyasaland.

Brass 17940 has anthers large for var. *sodenii,* in this agreeing better with *L. dregei* var. *nyasicus* Sprague in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 313 (1910); but in other characters it fits better var. *sodenii.*

Loranthus vittatus Engl. Bot. Jahrb. **30**: 301. 1901; Sprague in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 324. 1910.

Kota-kota District: Nchisi Mountain, common on *Syzygium* sp. in gulley rain-forest, shrub about 1 m. high, leaves thick and fleshy, nerves obscure, flowers pink, apex of tubes and of lobes red, 1400 m., July 25, 1946, *16941.* Chia area, common on *Syzygium* sp. in woodlands of the lake-plain, shrub 40–50 cm. high, leaves 3–5-nerved, very thick and fleshy, brownish-green, flowers pale pink to reddish-pink, 480 m., Sept. 1, 1946, *17468.* Tanganyika Territory, and now new to Nyasaland.

Brass 17468 is very large-leaved and further collection may show it to be separable.

Loranthus remotus Bak. & Sprague in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 327. 1910.

Kasungu District: Kasungu, on branches of *Ficus* sp., shrub 1 m. high, flowers yellowish-green, tube streaked with red within, apex of style red, 1000 m., Aug. 26, 1946, *17422.* Tanganyika Territory, Portuguese East Africa, and Nyasaland, for which this is the first record.

Loranthus annulatus Engl. & Krause, Bot. Jahrb. **51**: 469. 1914.

North Nyasa District: Nyika Plateau, parasitic on marginal trees of juniper forest, shrub 50 cm. high, freely branched, leaf-nerves prominent above, obscure beneath, base of perianth red, middle portion greenish-yellow, apex of lobes red, 2250 m., Aug. 11, 1946, *17182.* Tanganyika Territory and Nyasaland, for which this is the first record.

The range may be extended to S. Rhodesia if *L. eylesii* Sprague in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 343 (1910) is not specifically distinct; see Weimarck, Bot. Not. **1936**: 15 (1936).

Loranthus erianthus Sprague in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 359. 1910.

Kota-kota District: Nchisi Mountain, parasitic on various trees in rain-forest, shrub about 40 cm. high, leaves more or less fleshy, nerves raised above, impressed beneath, flowers red, neck, lobes, and filaments yellowish-green, style dark green, 1450 m., July 30, 1946, *17034.* Belgian Congo (Katanga), N. Rhodesia, and now new to Nyasaland.

Loranthus oleifolius (Wendl.) Cham. & Schlecht. Linnaea **3**: 209. 1828.

Lichtensteinia oleifolia ("oleaefolia") Wendl. Coll. Pl. Ex. **2**: 4. *pl. 39.* 1810.
Loranthus namaquensis Harv. in Harv. & Sond. Fl. Cap. **2**: 577. 1861–1862.

Kota-kota District: Chia area, on *Bauhinia* sp. in dry woodlands of lake plain, shrub about 1 m. high, flowers red, lobes blackish when expanded, greenish-white in bud, fruit red, 480 m., Sept. 6, 1946, *17559.* Nyasaland, N. Rhodesia, and Angola, southwards to South Africa.

Brass 17559 is perplexing. It is *L. oleifolius* except for the unusually large leaves. In this it resembles the Angolan *L. malacophyllus* Engl. & Krause, Bot. Jahrb. **43**: 408 (1909), but that differs much in the indumentum.

Loranthus tenuifolius Engl. Bot. Jahrb. **30**: 302. 1901; Sprague in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 389. 1911.

North Nyasa District: Nyika Plateau, on *Philippia* on edge of montane forest, shrub 30 cm. high, perianth-tube dark red, lobes red, filaments and style black, anthers and stigmas yellow, 2320 m., Aug. 16, 1946, *17263*; ibid., on tree on edge of montane forest, shrub 60 cm. high, flowers red, the tube darker than the lobes, filaments black, anthers reddish, stigmas and the style red, 2250 m., Aug. 16, 1946, *17264*. Tanganyika Territory and Nyasaland.

Very close to and perhaps not distinct from *L. inaequilaterus* Engl.

Loranthus inaequilaterus Engl. Bot. Jahrb. **28**: 384. 1900; Sprague in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 390. 1911.

Kota-kota District: Nchisi Mountain, in *Brachystegia* woodlands, shrub, flowers dark red, 1500 m., July 25, 1946, *Anthony 16940**; ibid., plentiful on *Tecoma* sp. on borders of forest, shrub 30–40 cm. high, leaves reddish, perianth red, filaments black, 1600 m., July 26, 1946, *16969*. Tanganyika Territory and Nyasaland.

Viscum shirense Sprague in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 406. 1911.

Zomba District: Zomba Plateau, parasitic on the branches of several species of rain-forest trees, much branched shrub about 8–100 cm. high, dioecious, 1450 m., June 3, 1946, *16177*; ibid., ♀ plant of *16177*, flowers yellowish-green, fruits red, 1450 m., June 3, 1946, *16178*. Kota-kota District: Nchisi Mountain, plentiful on a variety of host-trees in *Brachystegia* woodland, shrub 30–40 cm. high, bushy, compact, 1500 m., July 26, 1946, *16967*; ibid., ♀ of *16967*, 1500 m., July 26, 1946, *16968*. Cholo District: Cholo Mountain, common on various host-trees in rain-forest, shrub about 1 m. high, fruit brown, soft, fleshy, 1200 m., Sept. 21, 1946, *17716*. Tanganyika Territory, Portuguese East Africa, and Nyasaland.

SANTALACEAE

Thesium whyteanum Rendle, Trans. Linn. Soc. II. Bot. **4**: 42. 1894; Bak. & Hill in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 415. 1911.

Mlanje District: Mlanje Mountain; west slope, several examples on the grassy bank of a stream, shrub 50–60 cm. high, flowers green, 1780 m., June 24, 1946, *16406*; Luchenya Plateau, local in grasslands, shrub 40 cm. high, leaves somewhat glaucous, fleshy, acicular, flowers white, 2150 m., July 9, 1946, *16750*. Endemic to Nyasaland.

The above two gatherings have been compared with the type-specimen of *T. whyteanum* in the Herbarium of the British Museum (Natural History) (Mlanje Mountain, 1830 m., Oct. 1891, *A. Whyte 45*).

Thesium kilimandscharicum Engl. Hochgebirgsfl. Trop. Afr. (Abh. Preuss. Akad. **1891**:) 200. 1892; Bak. & Hill in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 424. 1911.

North Nyasa District: Nyika Plateau, common in open grasslands, perennial herb 15–20 cm. high, flowers green, 2300 m., Aug. 14, 1946, *17222*. Tanganyika Territory and now new to Nyasaland.

Thesium cymosum A. W. Hill, Kew Bull. **1910**: 183. 1910; Bak. & Hill in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 425. 1911.

Dedza District: Dedza, in *Brachystegia* woodlands, perennial herb 20–30 cm. high, flowers white, 1500 m., Sept. 13, 1946, *17638*. Nyasaland and S. Rhodesia.

Osyridicarpos schimperianus (Hochst. ex A. Rich.) A.DC. in DC. Prodr. **14**: 635. 1857; Bak. & Hill in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 432. 1911.

Thesium schimperianum Hochst. ex A. Rich. Tent. Fl. Abyss. **2**: 235. 1851.
Osyridicarpus kirkii Engl. Bot. Jahrb. **19** (Beibl. 47): 30. 1894; Bak. & Hill in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 432. 1911.

Mlanje District: Mlanje Mountain; west slopes, in brushy forest on steep slopes, scrambling shrub, 3 m. high, leaves more or less fleshy, flowers yellowish, 1650 m., July 18, 1946, *16873*. Abyssinia to Portuguese East Africa; new to Nyasaland.

I am unable to confirm the differences in relative length of perianth-tube and perianth-lobes alleged to separate *O. kirkii* from *O. schimperianus.*

Osyris compressa (Berg.) A.DC. in DC. Prodr. **14**: 634. 1857.

Colpoon compressum Berg. Pl. Cap. 38. *pl. 1, f. 1.* 1767.
Osyris abyssinica Hochst. ex A. Rich. Tent. Fl. Abyss. **2**: 236. 1851; Bak. & Hill in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 433. 1911.
Osyris arborea Wall. ex A.DC. in DC. Prodr. **14**: 633. 1857.
Osyris wightiana Wall. ex A.DC. in DC. Prodr. **14**: 633. 1857.

Mlanje District: Mlanje Mountain; west slopes, one example on grassy bank of a stream, tree or shrub 4 m. high, slender, erect, few-branched, leaves glaucous, flowers yellowish, fruits glaucous-green, 1530 m., July 18, 1946, *16878.* Kota-kota District: Nchisi Mountain, common in rocky situations in *Brachystegia* woodland, tree or shrub 2–4 m. high, leaves glaucous, flowers yellow, 1400 m., July 24, 1946, *16887.* Somaliland to South Africa; also in tropical Asia.

EUPHORBIACEAE

Euphorbia zambesiana Benth. Hook. Ic. Pl. *pl. 1305.* 1880. N.E.Br. in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 500. 1911.

Kota-kota District: Nchisi Mountain, on pathway in *Brachystegia* woodland, perennial herb 5 cm. high, numerous shoots crowded at the apex of a thick rootstock, sap milky, leaves reddish, inflorescence red, glands black, bracts white, 1400 m., July 25, 1946, *16932.* Uganda, southwards to Angola.

Euphorbia schimperiana Scheele, Linnaea **17**: 344. 1843. N.E.Br. in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 533. 1911.

Euphorbia ampla Hook. f. Jour. Linn. Soc. Bot. **6**: 20. 1862; N.E.Br. in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 532. 1911.

North Nyasa District: Nyika Plateau, shrubby edge of montane forest, herb 80 cm. high, sap milky, flowers green, 2300 m., Aug. 13, 1946, *17207**; ibid., occasional on shrubby edges of montane forest, herb, flowers and bracts green, 2250 m., Aug. 16, 1946, *17258.* Arabia, Aden, Anglo-Egyptian Sudan, Abyssinia, Uganda, Kenya, and Tanganyika Territory, Nyasaland, S. Rhodesia; also in the British Cameroons (Cameroon Mountain and Bamenda).

I do not consider *E. ampla* distinct from *E. schimperiana.* The resulting geographic range, although on the face of it an odd one, is paralleled by a significantly large number of other species. For further synonymy see N. E. Brown (ll. c.)

Euphorbia depauperata Hochst. ex A. Rich. Tent. Fl. Abyss. **2**: 241. 1851; N.E.Br. in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 537. 1911.

Zomba District: Zomba Plateau, in open grasslands, herb 15 cm. high, fleshy, flowers green, 1500 m., June 4, 1946, *Anthony 16222**. Kota-kota District: Nchisi Mountain, sporadic in *Brachystegia* woodland, herb 40–50 cm., stem and leaves red, flowers greenish, 1450 m., July 30, 1946, *17031**. North Nyasa District: Nyika Plateau, sporadic in open grassland, perennial herb, young flowering shoots now appearing after burning of the grass, flowers green, 2400 m., Aug. 11, 1946, *17164*; ibid., common in open grasslands, perennial herb 30–60 cm. high, leaves reddish, flowers yellowish, seldom fertile, 2300 m., Aug. 16, 1946, *17244*; ibid., plentiful in rocky shrubberies on grasslands, shrub about 1 m. high, sparsely branched, sap milky, stems and leaves reddish, flowers and bracts reddish, glands green, 2500 m., Aug. 18, 1946, *17321.* From the Anglo-Egyptian Sudan southwards to Nyasaland and N. and S. Rhodesia; also in the Cameroons.

Some of the above specimens are probably referable to *E. depauperata* var. *pubiflora* N.E.Br. in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 538 (1911); and *part* of Brass *17164* would fit the description of *E. depauperata* var. *pubescens* Pax, Ann. Ist. Bot. Roma **6**: 188 (1897). The pubescence of *E. depauperata* seems so variable and indefinite in the way it occurs that I prefer to treat *E. depauperata* in a wide sense and not refer the above specimens to named varieties.

Euphorbia matabelensis Pax, Ann. Naturh. Hofmus. Wien **15**: 51. *pl. 2, f. A*. 1900; N.E.Br. in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 546. 1911; White, Dyer & Sloane, Succ. Euphorb. (S. Afr.) **1**: 89. 1941.

Kasungu District: Kasungu, locally gregarious in *Brachystegia* woodland, shrub about 1 m. high, leafless at this season, flowers yellow, sap milky, 1000 m., Aug. 25, 1946, *17418*. Tanganyika Territory, Nyasaland, N. and S. Rhodesia.

Monadenium sp. nov.

Kota-kota District: Chintembwe, common in rocky grasslands, perennial herb about 2 cm. high, fleshy taproot to 8 cm. long × 2 cm. diam., flowering shoots appearing just above the ground after burning of the grass, flowers pink or pinkish-white, 1400 m., Sept. 9, 1946, *17585*.

Part of the above gathering has been submitted to Mr. P. R. O. Bally, of the Coryndon Museum, Nairobi, Kenya, who writes that the plant is close enough to a new species that he has described in a revision of *Monadenium*, to be published elsewhere, that it may bear the same specific name. The main differences are the glabrous stems (*Brass 17585*) and the larger peduncles, but the length of the latter is a variable character in the genus.

Mr. Bally's new species is known elsewhere only from two gatherings made by Geilinger in southern Tanganyika, near Dabaga, south of Iringa.

Mr. Bally writes that it is obviously a plant which belongs to the region where pyrophytic forms are frequent, and the new locality of *Brass 17585* fits in well with the general picture which the genus presents.

Bridelia cathartica Bertol. f. Illust. Mozambiz. **16**(13): *pl.* 6. 1852–1854 [not seen]; Hutch. in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 617. 1912.

Blantyre District: Blantyre, in *Brachystegia* woodlands, shrub 2 m. high, leaves greyish beneath, margins recurved, fruit green, 1100 m., June 17, 1946, *16349*. Kasungu District: Kasungu, occasional in *Brachystegia* woodlands, tree 4–5 m. high, fruit black when ripe, soft and fleshy, native name (Chinyanja) tantanyerere, 1000 m., Aug. 24, 1946, *17408*. Kenya, Tanganyika Territory, Zanzibar, Nyasaland, N. and S. Rhodesia, Portuguese East Africa, Bechuanaland, and the Transvaal.

I am using the name *B. cathartica* in a wide sense, to cover *B. niedenzui* Gehrm. Bot. Jahrb. **41**(Beibl. 95): 36 (1908) and *B. fischeri* Pax, Bot. Jahrb. **15**: 531 (1893). I do not consider these *specifically* distinct, although when the group is revised it should be possible to make varieties.

Pseudolachnostylis maprouneifolia Pax, Bot. Jahrb. **28**: 20 (1899) var. **glabra** (Pax) Brenan, comb. nov.

Cleistanthus ? glaucus Hiern, Cat. Afr. Pl. Welw. **1**^{4}: 955. 1900.
Pseudolachnostylis dekindtii Pax var. *glabra* Pax, Bot. Jahrb. **43**: 75. 1909.
Pseudolachnostylis glauca (Hiern) Hutch. in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 671. 1912.

Kasungu District: Kasungu, occasional in *Brachystegia* woodlands, tree 4–6 m. high, flowers yellowish-green, native name msolo, 1000 m., Aug. 24, 1946, *17411*. Chikwawa District: Chikwawa, frequent in *Combretum-Sterculia* woodland of stony ridges, tree 8–10 m. high, flowers green, native name (Chinyanja) mjenjeti, 300 m., Oct. 5, 1946, *17977*. The variety in the Belgian Congo, Tanganyika Territory, N. and ? S. Rhodesia, Angola; no specimens from Nyasaland hitherto in Herb. Kew., but recorded in For. Trees & Shrubs Brit. Emp. **2** (Nyasaland): 44 (1936).

P. glauca differs from *P. maprouneifolia* only in lack of hair, and I consider it no more than a variety of the latter.

Phyllanthus reticulatus Poir. in Lam. Encyc. **5**: 298. 1804; Hutch. in Thiselton-Dyer, Fl. Trop. Afr. $\mathbf{6}^1$: 700. 1912.

Kota-kota District: Chia area, frequent on termite mounds in dry woodlands of lake-plain, subscandent shrub 5–8 m. high, flowers green, sweet-scented, native name tantanyerere, 480 m., Sept. 7, 1946, *17563*. Chikwawa District: Lower Mwanza River, common in *Acacia* woodlands, shrub 3–4 m. high, native name tantanyerere, 180 m., Oct. 4, 1946, *17946*. Widespread in tropical Africa.

Phyllanthus nummulariifolius ("nummulariaefolia") Poir. in Lam. Encyc. **5**: 302. 1804; Hutch. in Thiselton-Dyer, Fl. Trop. Afr. $\mathbf{6}^1$: 710. 1912.

Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent in shrubby forest-margins, shrub 1.5 m. high, branches and foliage brownish-green, flowers green, fruit red, 1820 m., June 25, 1946, *16427*. In eastern Africa from the Anglo-Egyptian Sudan southwards to Portuguese East Africa, S. Rhodesia and Nyasaland; also in Madagascar.

Phyllanthus confusus Brenan, sp. nov.

Phyllanthus rotundifolius Klein ex Willd. var. *leucocalyx* sensu Bak. f. Trans. Linn. Soc. II. Bot. **4**: 38. 1894; non var. *leucocalyx* Muell.-Arg.

Phyllanthus hutchinsonianus sensu Hutch. in Thiselton-Dyer, Fl. Trop. Afr. $\mathbf{6}^1$: 718. 1912, pro parte, quoad spec. nyasana; non *P. hutchinsonianus* S. Moore.

Affinis *P. hutchinsoniano*, foliis plerumque minoribus tenuioribus margine haud vel vix incrassato-recurvatis, nervis lateralibus sollenniter aegre cernendis, pedicellis sepalisque fructiferis et capsulis minoribus, praesertim seminibus multo minoribus satis differt.

Herba vel fruticulus gracilis 10–120 cm. alta, glaberrima, saepe caulibus primariis pluribus e plantae inferibus ortis, qui caules erecti vel suberecti, haud vel parum flexuosi, graciles, plerumque circiter 1–1.5 mm. sed inferne usque ad 4 mm. diametro, subteretes, siccitate tenuissime longitudinaliter striati, atropurpurei, ramos laterales floriferos 0.5–9 cm. longos divergentes crebre sed singulatim emittentes. *Folia* oblongo-elliptica usque elliptica, (1.5–) 2–8 (–9) mm. longa, (0.8–) 1–4 mm. lata, tenuia, apice rotundata vel ea in ima rami parte plus minusve mucronata, basi rotundata, pallide glauco-viridia et saepissime plus minusve purpureo-tincta, marginibus haud vel parum incrassato-recurvatis, costa utrinque tenuissima inconspicua, nervis lateralibus utrinque 3–5 aegre cernendis; petiolus brevissimus; stipulae triangulari-acuminatae, 0.5–2 mm. longae. *Flores* monoeci, luteo-virides, masculi parvi ex axillis numerosis inferioribus rami singuli vel bini, foeminei majores ex axillis paucis superioribus singulatim exorientes. *Flores masculi* 1–2 mm. longe pedicellati; tepala 5, obovato-elliptica, concavo-convexa, apice rotundata, nervo unico centrali subsimplici fere ad apicem percursa, 2.5 mm. longa, 1.5 mm. lata; disci glandulae 5, circulares, laeves; stamina 2–3, filamentis in columellam circiter 1.1 mm. altam connatis, antheris apice subsessilibus, thecis rima transversa dehiscentibus. *Flores foeminei* 1–2 mm. longe pedicellati; tepala 5, elliptica vel oblongo-elliptica, apice rotundato subcucullata, 2.5–3 mm. longa, 1.6–2 mm. lata; discus crenis brevibus 5 vel nonnunquam subannularis; ovarium subglobosum, lobis 6 laevibus; styli ramis inclusis 1 mm. longi, divergentes, circiter 0.4 mm. supra basim bifidi, ramis 0.5–0.6 mm. longis apice curvatis sed vix incrassatis. *Fructus* pedicellis 1–3 mm. longis suffulti, tepalis persistentibus non vel vix accrescentibus, nonnunquam purpurascentibus; capsula depresso-globosa, 3 mm. lata, 1.8 mm. alta, laevis. *Semina* brunnea, 1.4 mm. longa, dorso lineis valde obscuris tenuibus circiter 10–12, sed has exacte enumerare difficile est.

Mlanje District: Mlanje Mountain, 1891, *A. Whyte s.n.* (Herb. Kew.); ibid., 2440–2740 m., Mar. 1897, *G. Adamson 354* (Herb. Kew.); ibid., Nov. 5, 1898, *J. Mahon s.n.* (Herb. Kew.); ibid.; Luchenya Plateau, gregarious in brushy forest-edges, shrub 30–120 cm. high, branches numerous, erect, red, flower yellowish-green, 1820 m., June 25, 1946, *16426*; ibid., abundant on sunny seepage-slopes in grasslands, herb 10–30 cm. high, reddish, flowers green, 2000 m., June 27, 1946, *16472* (TYPUS in Herb. Kew.). Without precise locality, 1891, *J. Buchanan 987* (Herb. Kew.).

P. hutchinsonianus S. Moore was based on a specimen collected by Swynnerton in the Chimanimani Mountains of Portuguese East Africa. When Hutchinson dealt with this species for the *Flora of tropical Africa* he identified with it some specimens from Nyasaland and one from Tanganyika Territory. With the material then available this treatment was probably justified. Since then more specimens from Nyasaland and Southern Rhodesia have come in, which show that the Nyasaland plants differ constantly in several points from those from Southern Rhodesia and Portuguese East Africa, and I am therefore describing the former as a new species, *P. confusus*. I have not seen the Tanganyika specimen (*Goetze 794* from the Livingstone Mountains); from the locality it is more likely to be *P. confusus* than *P. hutchinsonianus*.

P. confusus differs from *P. hutchinsonianus* mainly in that the fruits are borne on shorter pedicels 1–3 mm. long (3–5 mm. in *P. hutchinsonianus*), in the shorter tepals on the fruit, 2.5–3 mm. long (4–4.5 mm. in *P. hutchinsonianus*), in the smaller capsules 3 mm. across and 1.8 mm. high (4 mm. across and 3 mm. high in *P. hutchinsonianus*), in the smaller seeds 1.4 mm. long (2.3–2.5 mm. long in *P. hutchinsonianus*). In addition the leaves of *P. confusus* are in general smaller and thinner than those of *P. hutchinsonianus*, and they lack the incrassate and somewhat recurved margins of the latter species. The two species may normally be separated on facies, without recourse to the quantitative fruit characters.

P. confusus has a strong general resemblance to the South African *P. meyerianus* Muell. Arg. (*P. woodii* Hutch.) but the disc-glands of that species are strongly verruculose, not smooth as in *P. confusus*.

Phyllanthus sp.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common on banks of a forest-stream subject to flooding, shrub 40–100 cm. high, flowers green, 1820 m., July 1, 1946, *16571*.

This much resembles *P. confusus* Brenan, but is apparently dioecious, showing only ♀ flowers. I have not exactly matched it, but in the absence of ♂ flowers it is not feasible to discover its exact taxonomic position.

Phyllanthus sp.

North Nyasa District: Nyika Plateau, grassy edges of montane forest, ♂ shrub 80–100 cm. high, stem and leaves brownish, flowers green, ♀ not seen, 2340 m., Aug. 19, 1946, *17332*.

I have not been able to match this plant, but consider that more material, including ♀ flowers, is necessary to place it certainly.

Brass 17332 has thinly woody, much branched, puberulous stems; small glabrous leaves 2–5 mm. long, 1.5–2.5 mm. wide; dioecious flowers, ♂ only known; sepals 5; disc-glands strongly warted; stamens 3, their filaments connate almost their whole length; anthers dehiscing transversely.

It keys down to *P. arvensis* Muell. Arg. but differs from that in the woody puberulous stems, leaf-venation not much raised beneath, and the strongly warted disc-glands.

Drypetes natalensis (Harv.) Hutch. in Thiselton-Dyer, Fl. Cap. 5^2: 404. 1920; Pax & K. Hoffm. Pflanzenreich **81** ($4^{147(15)}$): 243. 1922.

Cyclostemon natalense Harv. Thes. Cap. **2**: 64. *pl. 200*. 1863.
Cyclostemon major Pax, Bot. Jahrb. **34**: 369. 1904.
Drypetes major (Pax) Hutch. in Thiselton-Dyer, Fl. Trop. Afr. $\mathbf{6}^1$: 689. 1912; Pax & K. Hoffm. Pflanzenreich **81** ($4^{147(15)}$): 246. 1922.
Drypetes zombensis Dunkley, Kew Bull. **1937**: 468. 1937.

Cholo District: Cholo, occasional in rain-forest, tree about 15 m. tall and 25 cm. in diameter, leaves convex, stiff, flowers greenish-white, borne in great abundance on trunk and branches, 1100 m., Sept. 29, 1946, *17876*. Kenya, Tanganyika Territory, Zanzibar, Portuguese East Africa, Nyasaland, and Natal.

Pax and K. Hoffmann (l.c.) distinguish *D. natalensis* from *D. major* by leaf-size (4–12 cm. long in the former, 10–25 cm. in the latter); this is utterly useless. Not only is the leaf-size variable, but also the length of the pedicels and the number of stamens. I very much suspect that *D. holtzii* Pax & K. Hoffm. Pflanzenreich **81** ($4^{147(15)}$): 243 (1922) is another mere synonym of *D. natalensis*.

The ovary and fruit of *D. natalensis* and *D. zombensis* are tomentellous, and specimens from as far north as Kenya also show this character. *D. major* was described from ♂ plants, the ovary-clothing thus not being known. Two specimens at Kew are however exactly *D. natalensis* except for a glabrous ovary, and I consider that they represent a distinct variety:

Drypetes natalensis (Harv.) Hutch. var. *leiogyna* Brenan, var. nov.; a typo ovario glabro nec tomentello differt.

KENYA COLONY: Coast Province, Kilifi District: Mida, ♀ flowers round, white, strongly scented, stigma 3-lobed, ♂ flowers white, 1.2 cm. in diameter, ♀ flowers usually borne on stems more than 2.5 cm. in diameter, ♂ flowers on small twigs as well as stems, native name (Swa.) mgandama, *R. M. Graham 2058* (Herb. Kew.).

ZANZIBAR: Near Haitajawa Hill, fairly common, growing in a cave well, much branched small tree to 4.5 m. high with white flowers produced in clusters on the stem and branches, 4 Dec. 1930, *Greenway 2653* (TYPUS varietatis in Herb. Kew.).

Drypetes gerrardii Hutch. in Thiselton-Dyer, Fl. Cap. 5^2: 405. 1920.

Drypetes battiscombei Hutch, Kew Bull. **1924**: 201. 1924.

Cholo District: Cholo Mountain, rain-forest substage, tree 6 m. high, 1400 m., Sept. 27, 1946, *17837*. Kenya, Natal, Pondoland, and now new to Nyasaland.

Like the last species, this presents a demonstration that a species from eastern tropical Africa is the same as an earlier-described South African species. The increasing frequency with which such a distribution is shown to exist is assuredly significant for those considering the past history of the African flora.

Uapaca nitida Muell. Arg. Flora **47**: 517. 1864; Hutch. in Thiselton-Dyer, Fl. Trop. Afr. $\mathbf{6}^1$: 639. 1912; Pax & K. Hoffm. Pflanzenreich **81** ($4^{147(15)}$): 307. 1922; Duvigneaud, Bull. Inst. Roy. Col. Belge **22**: 888. 1949.

Mlanje District: Likubula Gorge, common in woodlands, tree 5–8 m. high, flowers yellowish-green, fruits unripe, 840 m., June 20, 1946, *16375*. Kota-kota District: Chia area, occasional on banks of waterholes in dry woodlands of lake-plain, tree 8 m. high, fruits yellow-green, native name (Chinyanja) kasakoloe, 480 m., Sept. 3, 1946, *17517*. Belgian Congo, Tanganyika Territory, Portuguese East Africa, Nyasaland, N. and S. Rhodesia, and Angola.

Uapaca sansibarica Pax, Bot. Jahrb. **34**: 370. 1904; Hutch. in Thiselton-Dyer, Fl. Trop. Afr. 6^1: 636. 1912; Pax & K. Hoffm. Pflanzenreich **81** $(4^{147(15)})$: 304. 1922; Duvigneaud, Bull. Inst. Roy. Col. Belge **22**: 890. 1949.

Kota-kota District: Chia area, plentiful in sandy woodlands of the lake-plain, tree 10–15 m. high and 25–40 cm. in diameter, leaves more or less greyish beneath, fruits reddish, seeds green, native name (Chinyanja) kasakolowe, 480 m., Sept. 1, 1946, *17466*. Anglo-Egyptian Sudan, Uganda, Tanganyika Territory, Portuguese East Africa, Nyasaland, N. and S. Rhodesia.

Uapaca kirkiana Muell. Arg. Flora **47**: 517. 1864; Hutch. in Thiselton-Dyer, Fl. Trop. Afr. 6^1: 636. 1912; Pax & K. Hoffm. Pflanzenreich **81** $(4^{147(15)})$: 302. 1922; Duvigneaud, Bull. Inst. Roy. Col. Belge **22**: 891. 1949.

Mlanje District: Likubula Gorge, associated with *Brachystegia* sp. in woodlands, tree 8–10 m. high, fruits brownish, unripe and solitary in leaf-axils or lateral below the leaves, 840 m., June 20, 1946, *16376*. Kota-kota District: Nchisi Mountain, locally gregarious in *Brachystegia* woodland, tree 5–8 m. high and 15–30 cm. in diameter, fruits reddish, immature, native name (Chinyanja) msuku, 1400 m., Aug. 2, 1946, *17099*. Tanganyika Territory, Portuguese East Africa, N. and S. Rhodesia.

Antidesma venosum E. Mey. ex Tul. Ann. Sci. Nat. III. **15**: 232. 1851; Hutch. in Thiselton-Dyer, Fl. Trop. Afr. 6^1: 646. 1912; Pax & K. Hoffm. Pflanzenreich **81** $(4^{147(15)})$: 139. 1922.

Zomba District: Zomba, occasional in woodlands, tree 5–6 m. high, fruit reddish-black, edible, 1500 m., May 26, 1946, *16038*. Widespread in tropical Africa, southwards to the Transvaal and Natal; perhaps also in Madagascar.

Croton macrostachys Hochst. ex A. Rich. Tent. Fl. Abyss. **2**: 251. 1850–1851; Hutch. in Thiselton-Dyer, Fl. Trop. Afr. 6^1: 772. 1912.

District uncertain: North Road between Nzimba and Kasungu, on anthills in *Brachystegia* woodland, tree 15 m. high, leaves greyish beneath, fruit greyish, native name (Chinyanja) tensa, 1200 m., Aug. 23, 1946, *17384*. Eritrea to Nyasaland; also in French Guinea.

Clutia brassii Brenan, sp. nov.

Forsitan *C. whytei* Hutch. necessarius, foliis basi cordatis subsessilibus, ramulis minute sulcatis (vide infra) distinctissima; species perinsignis, primo aspectu cognoscenda.

Frutex usque ad 1–1.5 m. altus, glaberrimus. *Caules* ut videtur diu virides, elongati et subsimplices vel crebre ramosi, graciles sed rigidi, 40 cm. ab apice 4 mm. diametro, sulcis longitudinalibus valde confertis etiam juventute percursi, sulcis ceu scamnis vel tuberculis minutis plus minusve elongatis separati, his quibusque medio saepe unipunctata. *Folia* conferta, saepe imbricata, ut videtur sempervirentia, rigide papyracea usque subcoriacea, late ovata vel rotundata, (5–) 7–25 (–31) mm. longa, (5–) 7–16 (–20) mm. lata, basi cordata, apice rotundata vel obtusa, margine pallido integro cartilagineo paulum recurva; costa supra prominula subtus prominens et pallida, nervis lateralibus utrinque 4–8 supra obscuris subtus prominulis; petiolus 0–1 mm. longus. *Flores* dioici, virides vel ochroleuci, axillares; ♂ singuli vel bini pedicellis 1.5–2.5 mm. longis basi squamis pluribus pallidis imbricatis glabris; ♀ ignoti, ut videtur solitarii. *Flores masculi*: sepala 5, obovato-elliptica, 2–2.5 mm. longa, 1.3–1.5 mm. lata, apice rotundata, concavo-convexa, glandulis internis sed conspicuis aliquibus ornata, basi triade

glandularum filiformium 0.75 mm. longarum apice curvato-incrassatarum praedita; petala 5, 1 mm. longa, plana, infra medium in unguem 0.5 mm. latum abrupte augustata, supra medium ovato-triangularia et 1.5 mm. lata, subintegra, quoque basi glandula unica subquadrata 0.3 mm. alta et lata praedito; stamina 5, inferne in columellam tenuem 1.8 mm. altam connata; apice columellae filamenta libera 5, horizontaliter radiatim patentia, 0.75 mm. longa; antherae 0.5 mm. longae, siccitate albidae; ovarium rudimentarium in apicem columellae insidens, 0.75 mm. altum, 0.5 mm. latum, canalem fumarium simulans. *Flores foeminei* nondum visi. *Fructus* pedicellis 4.5–5 mm. longis suffultis. *Perianthium fructiferum* rigidum, incrassatum; sepala 5, obovato-elliptica, apice rotundata, 2.5 mm. longa, 1.5 mm. lata, basi glandulis binis praedita; petala 5, sepalis subaequalia, obovata, basim versus magis augustata, basi ut videtur eglandulosa. *Capsula* subglobosa, 4–5 mm. diametro, matura brunnea, glabra, siccitate rugulosa, in tres valvas acute bifidas findens; pericarpium 0.9–1 mm. crassum, lignosum. *Semina* plus minusve ellipsoidea, 3–3.2 mm. longa, 2.3–2.6 mm. lata, testa nigra nitida, sub lente valido subtilissime punctata; caruncula subquadrata 1.5 mm. lata, siccitate aurantiaca.

Mlanje District: Mlanje Mountain; west slope, in *Vaccinium* savannah, shrub 1.5 m. high, flowers green, 1830 m., June 21, 1946, *16398*; ibid., frequent in grassland, usually among rocks, shrub about 1 m. high, dioecious, leaves glaucous, flowers cream, 1850 m., July 18, 1946, *16866* (TYPUS in Herb. Kew.); ibid., ♀ plant of *16866*, flowers cream, fruits brown, 1850 m., July 18, 1946, *16867*.

This is a fine discovery by Mr. Brass of a new species of unusual distinction that seems altogether to have escaped those who have visited Mlanje Mountain in the past.

The arrangement of the glands within the ♂ flower is that of § *Pauciglandulosae* Pax & K. Hoffm., and here the only species to which *C. brassii* is at all akin is *C. whytei* Hutch. But *C. brassii* is most distinct in its cordate-based sessile leaves, few-flowered inflorescences (or the ♀ flowers solitary), the quite glabrous pedicels, the capsules without pale tubercles outside etc.

With the naked eye there seems nothing unusual about the stem. Under a × 10 lens the surface of the stem is however seen to be covered with low tubercles, elongate longitudinally, pointed at each end, and often confluent into irregular ridges. Closer inspection will reveal that each tubercle has, approximately in its middle, a tiny impressed dot. Lenticels are the obvious guess, but these tubercles occur on the very youngest green stems where lenticels would presumably be rather superfluous. The tuberculate surface of the stem persists until the latter has attained a diameter of at least 4 mm. (I have not seen older stems); the cork cambium is thus presumably late in starting. The appearance of the impressed dots on the tubercles recalls that of the gland on the back of cypress leaves. This odd stem structure is constant and characteristic in *C. brassii*, and quite absent in *C. whytei*.

I have sent some leaves and portions of stems of *C. brassii* to Dr. C. R. Metcalfe, Keeper of the Jodrell Laboratory, where he very kindly had them anatomically examined by Dr. M. Y. Stant.

Cavities occur in the cortex of the stem beneath the ridges; these spaces are most probably the remains of secretory glands, although there was no trace of the actual secretion. This, however, may be seasonal, as with the glands of *Osmanthus*. Sections showed evidence that a definite layer of cells was originally present as a lining to each cavity, although many of the constituent cells of this layer had become disorganised when the specimen was dried.

Transverse sections of the leaf show numerous similar cavities in the mesophyll, which are presumably to be interpreted in the same way. This suggestion is supported by the fact that similar glands have previously been recorded in the leaves of other species of *Clutia.*

All the available material of *C. brassii*, having been dried for the herbarium, is far from ideal for detailed anatomical work, and the above suggestions are therefore provisional. If anybody refinds *C. brassii* and is able to collect in spirit leafy stems from living plants, they would be welcomed.

I must gratefully thank Dr. Metcalfe and Dr. Stant for their help and interest in this matter, and for criticising and adding to the above anatomical notes.

Clutia abyssinica Jaub. & Spach, Illust. Pl. Orient. 5: 77. *pl. 468* (1855) var. **calvescens** Pax, Pflanzenreich **47**($4^{147(3)}$): 57. 1911.

Zomba District: Zomba Plateau, one example on a rocky bluff, shrub 1.5 m. high, several stems erect from an enlarged woody stock, flowers greenish, fruit immature, 1500 m., June 2, 1946, *16160*; ibid., in rain-forest regrowths, shrub 2 m. high, sap not milky, flowers greenish, 1500 m., June 5, 1946, *16268*. Mlanje District: Mlanje Mountain; west slopes, in brushy growths on a steep rock-slope, shrub 2.5 m. high, of slender upright habit, leaves more or less glaucous beneath, flowers cream-coloured, 1650 m., July 18, 1946, *16876*. The variety in eastern Africa from the Anglo-Egyptian Sudan and Abyssinia southwards to Nyasaland and N. Rhodesia.

Clutia paxii Knauf, Bot. Jahrb. **30**: 341. 1901; Pax, Pflanzenreich **47**($4^{147(3)}$): 60. 1911; Hutch. in Thiselton-Dyer, Fl. Trop. Afr. 6^1: 809. 1912.

North Nyasa District: Nyika Plateau, common in forest-edges and second-growths, shrub about 1 m. high, leaves greyish beneath, flowers green, 2440 m., Aug. 11, 1946, *17167*; ibid., ♂ of *17167*, 2440 m., Aug. 11, 1946, *17168*. Kenya ?, southwest Tanganyika Territory, S. Rhodesia, and now recorded for the first time from Nyasaland.

Clutia sp. aff. **swynnertonii** S. Moore, Jour. Linn. Soc. Bot. **40**: 197. 1911; Hutch. in Thiselton-Dyer, Fl. Trop. Afr. 6^1: 811. 1912.

Zomba District: Zomba Plateau, one example in a moist grassy clearing, shrub 1 m. high, flowers greenish, fruit unripe, 1400 m., May 28, 1946, *16066*. Kotakota District: Nchisi Mountain, among rocks in *Brachystegia* woodland, shrub 80 cm. high, flowers and fruit green, 1600 m., July 31, 1946, *17058*.

These two gatherings are very close indeed to *C. swynnertonii* both in facies and characters, except for the fact that they are monoecious and not dioecious. *Whyte s.n.* (between Kondowe and Karonga, Nyasaland) in Herb. Kew., is similarly monoecious and is the same as *Brass 17058*; the Whyte specimen was cited under *C. volubilis* Hutch. in the *Flora of tropical Africa.* I am unwilling to name these plants finally, since I feel that the distribution of the sexes may perhaps vary in *C. swynnertonii*, as it does in some other normally dioecious Euphorbiaceae, e.g. *Mercurialis.* Further careful observation is required on the spot.

The monoecious *C. kamerunica* Pax belongs to the § *Pauciglandulosae* and not, as our plants do, to the § *Multiglandulosae*; and in addition has a subglabrous ovary, not pubescent all over, and glabrous not pubescent styles.

Adenocline acuta (Thunb.) Baill. Étud. Gén. Euph. 457. 1858; Pax, Pflanzenreich **63**($4^{147(7)}$): 410. *f.* 67. 1914; Milne-Redhead, Kew Bull. **1950**: 349. 1950.

Acalypha acuta Thunb. Fl. Cap. (ed. Schult.) 546. 1823.

Zomba District: Zomba Plateau, frequent in grassy rain-forest regrowths, herb 2 m. high, of weak scrambling habit, flowers and fruit green, 1450 m., June 4, 1946, *16206*. Nyasaland and South Africa.

Acalypha chirindica S. Moore, Jour. Linn. Soc. Bot. **40**: 199. 1911; Hutch. in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 885. 1912; Pax & K. Hoffm. Pflanzenreich **85**($4^{147(17)}$): 81. 1924; Staner, Bull. Jard. Bot. Brux. **15**: 135. 1938.

Cholo District: Nswadzi River, in riverine rain-forest, scrambling shrub 2–3 m. high, ♂ flowers whitish, stigmas of ♀ red, 840 m., Sept. 29, 1946, *17869*. Belgian Congo, Tanganyika Territory, Portuguese East Africa, N. and S. Rhodesia, and Nyasaland.

Acalypha senensis Klotzsch in Peters, Reise Mossamb. Bot. 96. 1861; Hutch. in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 888. 1912; Pax & K. Hoffm. Pflanzenreich **85**($4^{147(16)}$): 79. 1924; Staner, Bull. Jard. Bot. Brux. **15**: 136. 1938.

Blantyre District: Blantyre, in old gardens, shrub about 50 cm. high, flowers red, 1100 m., June 18, 1946, *16361**. Chikwawa District: Chikwawa, one example in dry woodland, subshrub 30 cm. high, 200 m., Oct. 5, 1946, *17986**. Widespread in tropical Africa, extending southwards to Bechuanaland, Southwest Africa, and the Transvaal.

Acalypha fruticosa Forsk. Fl. Aegypt.-Arab. 161. 1775; Hutch. in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 895. 1912; Pax & K. Hoffm. Pflanzenreich **85**($4^{147(16)}$): 169. 1924; Staner, Bull. Jard. Bot. Brux. **15**: 140. 1938.

Chikwawa District: Chikwawa, common in dry brushy forest of elevated alluvial plain, shrub 3–4 m. high, native name (Chinyanja) kachocho, 200 m., Oct. 2, 1946, *17896*. Eastern tropical Africa, the Transvaal, and India; new to Nyasaland.

Acalypha psilostachya Hochst. ex A. Rich. Tent. Fl. Abyss. **2**: 246. 1851; Hutch. in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 899. 1912; Pax & K. Hoffm. Pflanzenreich **85**($4^{147(16)}$): 134. 1924; Staner, Bull. Jard. Bot. Brux. **15**: 142. 1938.

Cholo District: Cholo Mountain, frequent in rain-forest regrowths, shrub 1–1.5 m. high, 1200 m., Sept. 19, 1946, *17652*. In eastern tropical Africa from the Anglo-Egyptian Sudan southwards to Nyasaland.

Lepidoturus laxiflorus Benth. Hook. Ic. Pl. *pl. 1297*. 1879; Prain in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 913. 1912.

Alchornea laxiflora (Benth.) Pax & K. Hoffm. in Pax, Pflanzenreich **63**($4^{147(7)}$): 245. 1914.

Cholo District: Cholo Mountain, frequent in rain-forest substage, tree 8–10 m. high and 20 cm. in diameter at breast-height, deciduous, young leaves reddish-brown, conspicuous, 1200 m., Sept. 24, 1946, *17776*. Widespread in tropical Africa.

Macaranga kilimandscharica Pax in Engl. Pflanzenw. Ost-Afr. C: 238. 1895; Prain in Thiselton-Dyer, Fl. Trop. Afr. **6**^{1}: 938. 1912; Pax, Pflanzenreich **63**($4^{147(7)}$): 344. 1914.

North Nyasa District: Nyika Plateau, common in montane forest of escarpment, tree 10–15 m. high, and to 40 cm. in diameter, young and old leaves brownish-red, fruit unripe, native name (Chinyanja) mkungu, 2200 m., Aug. 17, 1946, *17294*. Uganda, Kenya, Tanganyika Territory, and Nyasaland.

Macaranga capensis (Baill.) Sim, For. Fl. Cape Col. 314. *pl. 139*. 1907; Pax, Pflanzenreich **63**($4^{147(7)}$): 346. 1914.

Mappa capensis Baill. Adansonia **3**: 155. 1862–1863.
Macaranga usambarica Pax & K. Hoffm. in Pax, Pflanzenreich **63**($4^{147(7)}$): 344. *f. 56*. 1914.

Cholo District: Cholo Mountain, plentiful in second-growth rain-forest, tree up to about 25 m. high, fruit immature, diameter at breast-height up to about 40 cm., 1200 m., Sept. 22, 1946, *17736*. Kenya ? and Tanganyika Territory, southwards to Natal, Zululand, and Pondoland.

M. usambarica is not specifically distinct from the South African *M. capensis*.

Tragia okanyua Pax, Bull. Herb. Boiss. **6**: 735. 1898; Prain in Thiselton-Dyer, Fl. Trop. Afr. $\mathbf{6}^{1}$: 986. 1913; Pax & K. Hoffm. Pflanzenreich $\mathbf{68}(4^{147(9-11)})$: 78. 1919.

Chikwawa District: Lower Mwanza River, occasional in dry brushy forest, vine 2–4 m. high, with stinging hairs, flowers green, 180 m., Oct. 4, 1946, *17949*. Portuguese East Africa, Nyasaland, N.? and S. Rhodesia, Angola, Bechuanaland, Southwest Africa, and The Transvaal.

Tragiella natalensis (Sond.) Pax & K. Hoffm. Pflanzenreich $\mathbf{68}(4^{147(9-11)})$: 105. 1919.

Tragia natalensis Sond. Linnaea **23**: 107. 1850; Prain in Thiselton-Dyer, Fl. Trop. Afr. $\mathbf{6}^{1}$: 974. 1913.

Cholo District: Cholo Mountain, in rain-forest undergrowth, twining vine 3 m. high, furnished with stinging hairs, flowers green, 1200 m., Sept. 22, 1946, *17732*. Eastern Africa from the Anglo-Egyptian Sudan southwards to South Africa, but apparently not previously recorded from Nyasaland.

Maprounea africana Muell. Arg. in DC. Prodr. $\mathbf{15}^{2}$: 1191. 1866; Pax, Pflanzenreich $\mathbf{52}^{2}(4^{147(5)})$: 178. 1912: Prain in Thiselton-Dyer, Fl. Trop. Afr. $\mathbf{6}^{1}$: 1004. 1913.

Kota-kota District: Chia area, brushy growths on banks of a waterhole on dry lake-plain, tree 7 m. high, deciduous, bark pale brown, corky, now in young leaf, flowers reddish, Sept. 5, 1946, *17536*. Widespread in the savannah regions of central and southern tropical Africa, extending north to the Cameroons and Ubangi-Shari, and southwards to N. and S. Rhodesia and Angola, but apparently previously unrecorded for Nyasaland.

Numerous varieties have been recognised, but at present I think it better to consider the species in a wide sense.

Sapium ellipticum (Hochst.) Pax, Pflanzenreich $\mathbf{52}^{2}(4^{147(5)})$: 253. 1912.

Sclerocroton ellipticus Hochst. Flora **28**: 85. 1845.

Sapium mannianum (Muell. Arg.) Hiern, Cat. Afr. Pl. Welw. **1**: 986. 1900; Prain in Thiselton-Dyer, Fl. Trop. Afr. $\mathbf{6}^{1}$: 1016. 1913.

Excaecaria manniana Muell. Arg. Flora **47**: 433. 1864.

Cholo District: Cholo Mountain, frequent in rain-forest borders, tree 8–10 m. high, sap milky, flowers yellow-green, 1200 m., Sept. 21, 1946, *17704*. Widespread in tropical Africa; also occurring in Natal.

ULMACEAE

Celtis africana Burm. f. Prodr. Fl. Cap. 31. 1768.

Celtis kraussiana Bernh. Flora **28**: 87. 1844; Rendle in Prain, Fl. Trop. Afr. $\mathbf{6}^{2}$: 3. 1916; Hauman, Fl. Congo Belge **1**: 43. 1948.

Cholo District: Cholo Mountain, in primary rain-forest, tree 25 m. high, flowers brownish-white, fruit immature, 1200 m., Sept. 22, 1946, *17744*. Eastern Africa from the Anglo-Egyptian Sudan southwards to South Africa, westwards to the Cameroons and Angola; also in Arabia.

I am most grateful to Mr. B. De Winter, to whose notice it had been brought by Miss I. C. Verdoorn, for drawing my attention to this important and unfortunately necessary name-change. Burmann (l.c.) refers back to the unmistakeable plate and description by his father in Rar. Pl. Afr. 242. *pl. 88* (1739).

Trema guineënsis (Schumach. & Thonn.) Ficalho, Pl. Uteis 261. 1884; Rendle in Prain, Fl. Trop. Afr. **6**^{2}: 11. 1916; Hauman, Fl. Congo Belge **1**: 48. *pl. 8*. 1948.

Celtis guineënsis Schumach. & Thonn. Beskr. Guin. Pl. 160. 1827.

Cholo District: Cholo Mountain, plentiful in secondary rain-forest, tree up to 25 m. high and to about 50 cm. in diameter at breast-height, flowers greenish, 1200 m., Sept. 22, 1946, *17743*. A tree of secondary seres in forest, very common and widespread in tropical Africa; also in Natal, Madagascar, Mauritius, the Seychelles, and Arabia.

MORACEAE

Ficus capensis Thunb. Diss. *Ficus* 6, 13. 1786; Hutch. in Prain, Fl. Trop. Afr. **6**^{2}: 101. 1916; Lebrun & Boutique, Fl. Congo Belge **1**: 116. 1948.

Kota-kota District: Nchisi Mountain, in rain-forest, tree 15 m. high and 40 cm. in diameter, receptacles green mottled with white, borne on much branched leafless shoots over 1 m. long pendent on the stem, sap milky, 1400 m., July 30, 1946, *17033*. Cholo District: Cholo Mountain, occasional in rain-forest, tree 25 m. high, 80 cm. in diameter at breast-height, leaf-nerves whitish, fruit soft, brownish-red, depressed-globose, about 3–3.5 cm. long and 3.5–4 cm. wide, native name (Chinyanja) tundu, 1200 m., Sept. 24, 1946, *17775*. Widespread in South and tropical Africa.

Ficus vallis-choudae Del. Ann. Sci. Nat. II. **20**: 94. 1843; Hutch. in Prain, Fl. Trop. Afr. **6**^{2}: 103. 1916; Lebrun & Boutique, Fl. Congo Belge **1**: 119. 1948.

Cholo District: Cholo, common in rain-forests, tree to 30 m. tall and 60 cm. in diameter, sap milky, yellowish, fruit to 4.5 cm. long and in diameter, obovate-globose, solitary, native name (Chinyanja) tundu, 1100 m., Sept. 29, 1946, *17875*. Widespread in tropical Africa, but not previously recorded from Nyasaland.

Mr. Brass' specimen shows the receptacle more densely pubescent than usual and it may prove to be varietally separable from *F. vallis-choudae*.

Ficus gnaphalocarpa (Miq.) Steud. ex A. Rich. Tent. Fl. Abyss. **2**: 270. 1851; Hutch. in Prain, Fl. Trop. Afr. **6**^{2}: 104. 1916; Lebrun & Boutique, Fl. Congo Belge **1**: 119. 1948.

Sycomorus gnaphalocarpa Miq. Lond. Jour. Bot. **7**: 113. 1848.

Kota-kota District: Kasabula's Village, occasional in old secondary forest, tree 12 m. high and 35 cm. in diameter, deciduous, young leaves only, receptacles mostly on old wood below leaves, green flecked with white, sap milky, yellow, native name (Chichewa) mkuju, 1000 m., Aug. 3, 1946, *17122*. Chia area, occasional on alluvial soil on dry lake plain, tree to 20 m. high and 60 cm. in diameter, mature receptacles 2.5–3.5 cm. long and 3–4 cm. in diameter, depressed-globose, soft, yellow, solitary or in pairs in leaf-axils, native name (Chinyanja) tundu, 480 m., Sept. 7, 1946, *17566*. Widespread in tropical Africa.

Ficus exasperata Vahl, Enum. **2**: 197. 1806; Hutch. in Prain, Fl. Trop. Afr. **6**^{2}: 110. 1916; Lebrun & Boutique, Fl. Congo Belge **1**: 126. 1948.

Cholo District: Cholo Mountain, locally plentiful in rain-forest, tree 25 m. high and up to 75 cm. in diameter at breast-height, receptacles immature, leaves stiff, scabrous, 1200 m., Sept. 24, 1946, *17792*. Widespread in tropical Africa, and said to occur in Arabia.

Ficus sonderi Miq. Ann. Mus. Bot. Lugd.-Bat. **3**: 295. 1867; Hutch. in Prain, Fl. Trop. Afr. **6**^{2}: 169. 1916; Lebrun & Boutique, Fl. Congo Belge **1**: 144. 1948.

Kasungu District: Kasungu Hill; Kasungu, on dry rocky slopes, shapely tree to 10 m. high, with spreading stiff branches, sap milky, receptacles reddish-green, immature, 1100 m., Aug. 28, 1946, *17461*. Uganda to South Africa.

Bosqueia phoberos Baill. Adansonia **8**: 72. *pl. 4*. 1867–1868; Hutch. in Prain, Fl. Trop. Afr. **6**^{2}: 219. 1917.

Cholo District: Cholo Mountain, common in rain-forest, tree up to about 20 m. high and up to 50 cm. in diameter at breast-height, flowers white, 1200 m., Sept. 21, 1946, *17714*. Uganda, Kenya, Tanganyika Territory, Zanzibar, Portuguese East Africa, Nyasaland (this is the first record), S. Rhodesia, and possibly in the Transvaal.

Treculia africana Decne. Ann. Sci. Nat. III. **8**: 109. *pl. 3, f. 86–99*. 1847; Hutch. in Prain, Fl. Trop. Afr. **6**^{2}: 226. 1917; Hauman, Fl. Congo Belge **1**: 90. 1948.

Kota-kota District: Chia area, on bank of a waterhole in dry woodlands, tree 15 m. high and 35 cm. in diameter, sap milky, flowers white, heads 3–3.5 cm. in diameter, globose, 480 m., Sept. 1, 1946, *17464*. Widely distributed in tropical Africa.

Myrianthus holstii Engl. Monogr. Afr. Pflanzen-Fam. & Gatt. **1** (Moraceae africanae): 41. *pl. 17 E*. 1898; Rendle in Prain, Fl. Trop. Afr. **6**^{2}: 237. 1917; Hauman, Fl. Congo Belge **1**: 84. 1948.

Kota-kota District: Nchisi Mountain, frequent in rain-forest, tree up to about 20 m. high and 50 cm. in diameter at breast-height, leaves grey beneath, fruit brown when ripe, eaten by natives, 1500 m., Sept. 11, 1946, *17615*. Belgian Congo, Ruanda-Urundi, Kenya, Tanganyika Territory, Nyasaland, and S. Rhodesia.

I believe that Rendle and Hauman are correct in keeping this species distinct from *M. arboreus* Beauv.

URTICACEAE

Fleurya peduncularis Wedd. in DC. Prodr. **16**^{1}: 75. 1869.

Fleurya mitis Wedd. Ann. Sci. Nat. IV. **1**: 183. 1854, nom. nud; N.E.Br. in Thiselton-Dyer, Fl. Cap. **5**^{2}: 546. 1925, cum descr.

Fleurya capensis sensu Wedd. Monogr. Urt. (Arch. Mus. Hist. Nat. Paris **9**:) 117. *pl. 1 A, f. 7-8*. 1856–1857; Rendle in Prain, Fl. Trop. Afr. **6**^{2}: 249. 1917. Non *F. capensis* Wedd. Ann. Sci. Nat. IV. **1**: 183. 1854.

Cholo District: Cholo Mountain, in rain-forest regrowths, soft scrambling shrub 1–2 m. high, furnished with stinging hairs, flowers green, 1200 m., Sept. 22, 1946, *17733*. Tanganyika Territory, S. Rhodesia, and South Africa; new to Nyasaland.

The nomenclature of this species is complicated, and since I am unable to adopt either of the names used by Rendle in the *Flora of tropical Africa* and by Brown in the *Flora capensis*, it seems desirable to give the reasons.

Fleurya capensis was first published by Weddell in 1854 (l.c.); there was no description, but a reference to *Urtica capensis* Thunb. Now *Urtica capensis* Thunb. (Prodr. Fl. Cap. 31. 1794; Fl. Cap. **1**: 565. 1813) was based on *Urtica capensis* L.f. Suppl. Pl. 417 (1781); although Thunberg's *Prodromus* omits back-references, it is clear from his later *Flora capensis* that Thunberg had *U. capensis* L.f. in mind. According to N.E. Brown (Kew Bull. **1913**: 80, 81. 1913) the type of Thunberg's description of *Urtica capensis* is *Australina capensis* Wedd.; in Fl. Cap. **5**^{2}: 554 (1925) Brown revised his opinion and made Thunberg's plant a distinct species, *Australina thunbergii* N.E.Br. The true *Urtica capensis* L.f. is, according to Prain in Thiselton-Dyer, Fl. Cap. **5**²: 473 (1920), not urticaceous at all, but a species of *Acalypha* (Euphorbiaceae).

N.E. Brown in the *Flora capensis* realised that *Fleurya capensis* could not be used, but unfortunately adopted instead *Fleurya mitis* Wedd., a nomen nudum not previously validated. The only legitimate name available seems to be *F. peduncularis* Wedd., which I therefore adopt.

To sum all this up: three species are involved.

(1) *Urtica capensis* L.f. (1781) = *Acalypha* sp.

(2) *Urtica capensis* (non. L.f.) sensu Thunb. (1794, 1813) = *Fleurya capensis* Wedd. (1854) = *Australina capensis* (non Wedd.) sensu N.E. Br. (1913) = *Australina thunbergii* N.E. Br.

(3) *Fleurya capensis* (non. Wedd. 1854) sensu Wedd. (1856–7) = *Fleurya mitis* Wedd. ex N.E. Br. = *Fleurya peduncularis* Wedd.

Laportea alatipes Hook. f. Jour. Linn. Soc. Bot. **7**: 215. 1864; Rendle in Prain, Fl. Trop. Afr. **6**²: 252. 1917; Hauman, Fl. Congo Belge **1**: 194. 1948.

Fleurya alatipes (Hook. f.) N.E.Br. in Thiselton-Dyer, Fl. Cap. **5**²: 547. 1925.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common in openings in forest, shrub about 1 m. high, leaves with stinging hairs, native name (Chinyanja) kwisa, 1820 m., July 1, 1946, *16572*. British Cameroons (Cameroon Mountain), Belgian Congo, Abyssinia, Uganda, Kenya, Tanganyika Territory, S. Rhodesia, and Natal; new to Nyasaland.

Girardinia condensata (Hochst. ex Steud.) Wedd. Monogr. Urt. (Arch. Mus. Hist. Nat. Paris 9:) 169. 1856–1857; Rendle in Prain, Fl. Trop. Afr. **6**²: 266. 1917; Hauman, Fl. Congo Belge **1**: 196. 1948.

Urtica condensata Hochst. ex Steud. Flora **33**: 260. 1850.

Cholo District: Cholo Mountain, common locally under open canopy in rain-forest, shrub 50–100 cm. high, stem simple or sparsely branched, furnished with virulent stinging hairs, 1200 m., Sept. 24, 1946, *17778*. Widely but apparently thinly spread in tropical Africa.

Boehmeria platyphylla D. Don, Prodr. Fl. Nep. 60. 1825; Rendle in Prain, Fl. Trop. Afr. **6**²: 285. 1917; Hauman, Fl. Congo Belge **1**: 210. 1948.

Zomba District: Zomba Plateau, undergrowth of riverine rain-forest, shrub 2 m. high, 1400 m., May 28, 1946, *16057*. Kota-kota District: Nchisi Mountain, occasional in shrubberies bordering rain-forest, shrub 2 m. high, 1500 m., July 29, 1946, *17022*. Widespread in the forest regions of tropical Africa, Madagascar, the Mascarene Islands, and tropical Asia.

Droguetia iners (Forsk.) Schweinf. Bull. Herb. Boiss. **4**(app. 2): 146. 1896; Rendle in Prain, Fl. Trop. Afr. **6**²: 303. 1917; Hauman, Fl. Congo Belge **1**: 217. 1948.

Urtica iners Forsk. Fl. Aegypt.-Arab. 160. 1775.

Cholo District: Cholo Mountain, gregarious in rain-forest regrowths, shrub about 1 m. high, branches ascending, 1350 m., Sept. 26, 1946, *17814*. British Cameroons, Belgian Congo, Abyssinia, Uganda, Kenya, Tanganyika Territory, and Nyasaland; also in Arabia, India, and Java.

MYRICACEAE

Myrica pilulifera Rendle, Trans. Linn. Soc. II. Bot. **4**: 43. 1894; Hutch. in Prain, Fl. Trop. Afr. **6**²: 311. 1917.

Mlanje District: Mlanje Mountain; west slope, common in second-growth forest, tree 4–5 m. high, 1850 m., July 18, 1946, *16862*. Nyasaland and S. Rhodesia.

In *M. pilulifera* the glands on the lower surface of the leaves appear very few or absent, while in *M. salicifolia*, the following species, the glands are abundant and conspicuous. This is an easier and much more satisfactory way of distinguishing these two species than to use the petiole-length as Rendle does in his key in the *Flora of tropical Africa* to the species of *Myrica*.

Myrica salicifolia Hochst. ex A. Rich. Tent. Fl. Abyss. **2**: 277. 1851; Hutch. in Prain, Fl. Trop. Afr. **6**^{2}: 313. 1917; E. A. Bruce, Kew Bull. **1940**: 53. 1940; Boutique, Fl. Congo Belge **1**: 34. 1948.

Myrica kilimandscharica Engl. Hochgebirgsfl. Trop. Afr. (Abh. Preuss. Akad. Wiss. Berl. **1891**:) 188. 1892; Hutch. in Prain, Fl. Trop. Afr. **6**^{2}: 312. 1917; Boutique, Fl. Congo Belge **1**: 37. 1948.

Zomba District: Zomba Plateau, one of the chief trees in old secondary rainforest, tree 5–10 m. high and up to about 30 cm. in diameter at breast-height, leaves convex, slightly aromatic, margins much recurved, flower-spikes reddish, 1500 m., June 7, 1946, *16316*. North Nyasa District: Nyika Plateau, one of the chief trees of second-growth forest, tree 4–8 m. high and to 50 cm. in diameter, leaves stiff, convex, just coming into flower, 2300 m., Aug. 14, 1946, *17221*; ibid., usually the chief constituent of grassland shrubberies, shrub 30–150 cm. high, leaves stiff, convex, 2500 m., Aug. 18, 1946, *17324*. In east Africa from Abyssinia southwards to Tanganyika Territory and Nyasaland; there have been, hitherto, no Nyasaland specimens of *M. salicifolia* in Herb. Kew., but *M. kilimandscharica* was recorded in Check-Lists For. Trees & Shrubs Brit. Emp. **2** (Nyasaland): 55 (1936).

Miss E. A. Bruce (l.c.) considered *M. kilimandscharica* to be synonymous with *M. salicifolia*. I follow her view, rather than keeping them separate and following Hutchinson and, more recently, Boutique, whose distinguishing characters for the two species I cannot make work.

Myrica conifera Burm. f. Fl. Cap. Prodr. 31. 1768; Hutch. in Prain, Fl. Trop. Afr. **6**^{2}: 314. 1917.

North Nyasa District: Nyika Plateau, forming dense shrubberies on banks of grassland streams, shrub 1.5 m. high, leaves yellowish-brown beneath, flower-buds only, 2300 m., Aug. 18, 1946, *17313*. Southwestern Tanganyika Territory and Angola, southwards to South Africa.

SALICACEAE

Salix subserrata Willd. Sp. Pl. **4**: 671. 1806; Milne-Redhead, Kew Bull. **1936**: 474. 1936.

Salix safsaf baelledi Forsk. Fl. Aegypt.-Arab. lxxvi. 1775, nom. nud.

Salix safsaf Forsk. ex Trautv. Sal. 6. *pl. 2*. 1836; Skan in Prain, Fl. Trop. Afr. **6**^{2}: 318. 1917.

Dowa District: Dowa, gregarious on swampy stream-banks, shrub 3–5 m. high, branchlets upright, branchlets and petioles reddish-brown, leaves glaucous beneath, about 1500 m., July 23, 1946, *16880*. Widespread in tropical Africa, to Bechuanaland in the south, extending northwards to Egypt, Libya, Palestine, and Syria.

HYDROCHARITACEAE

Ottelia ulvifolia (Planch.) Walp. Ann. **3**: 510. 1852–1853; Dandy, Jour. Bot. **72**: 138. 1934.

Damasonium ulvaefolium Planch. Ann. Sci. Nat. III. **11**: 81. 1849.

Kota-kota District: Kota-kota, in fresh water, 460 m., Aug. 1946, *Vernay 17398.* Chia area, associated with *Nymphaea* spp. in waterholes, leaves brownish, submerged, fruiting peduncles loosely spirally twisted, flowers yellow, crinkled, 480 m., Sept. 3, 1946, *17505.* Widespread in tropical Africa and Madagascar.

I am very grateful to Mr. J. E. Dandy of the British Museum (Natural History) for kindly checking my determinations in this family.

BURMANNIACEAE

Burmannia welwitschii Schlecht. Repert. Sp. Nov. **21**: 84. 1925; Jonker, Monogr. Burm. 100. 1938.

Burmannia bicolor Mart. var. *africana* Ridl. Jour. Bot. **25**: 85. 1887.

Kota-kota District: Chia area, moist grassy edge of a marsh, herb 10–20 cm. high, stem green, outer lobes of flower white, inner purple, wings of ovary lilac, 480 m., Sept. 1, 1946, *17473.* Tanganyika Territory, southwards to S. Rhodesia and Angola, westwards to French Guinea and the Gaboon (fide Jonker, l.c.).

I am grateful to Mr. P. Taylor for his help in naming this plant.

ORCHIDACEAE[53]

Holothrix johnstoni Rolfe, Kew Bull. **1896**: 47. 1896.

Mlanje District: Mlanje Mountain; Luchenya Plateau, associated with *Sphagnum* under wet shady rocks on grasslands, flowers pink, later white, 2140 m., June 27, 1946, *16459;* under shelter of rocks on grassland, flowers pink, 2100 m., July 16, 1946, *Anthony 16855.* Nyasaland.

Habenaria macrostele Summerh. Bot. Not. **1937**: 184. 1937.

Zomba District: Zomba Plateau, on a moist shaded grassy slope, flower tepals green, column white, 1450 m., June 5, 1946, *16231.* Nyasaland and S. Rhodesia (Inyanga).

Disa zombica N. E. Brown in Dyer, Fl. Trop. Afr. 7: 278. 1898.

Zomba District: Zomba Plateau, scattered over grasslands, common, flowers over, 1750–1800 m., 1946, *16114.* Nyasaland and southern Tanganyika Territory.

Satyrium chlorocorys Reichenb. f. ex H. H. Johnston, Kilimanjaro Exp. App. 346. 1886 (nomen); ex Rolfe in Dyer, Fl. Trop. Afr. 7: 268. 1898.

Zomba District: Zomba Plateau, locally common on moist shady slopes, flowers green, 1450 m., June 5, 1946, *16230.* Tanganyika, Nyasaland, S. Rhodesia (Inyanga).

Satyrium densum Rolfe in Dyer, Fl. Trop. Afr. 7: 270. 1898.

Zomba District: Zomba Plateau, in *Brachystegia* woodlands, flowers pink, 1500 m., June 4, 1946, *Anthony 16199;* in grass on a moist sunny slope, flowers pale pink, 1500 m., June 5, 1946, *16243.* Nyasaland.

Satyrium speciosum Rolfe in Dyer, Fl. Trop. Afr. 7: 574. 1898.

Zomba District: Zomba Plateau, in grass on moist shady slope, flowers white, 1450 m., June 5, 1946, *16241.* Kenya Colony, Nyasaland, S. Rhodesia, Portuguese East Africa.

Polystachya Hook. sect. **Eurychilae** Summerh., sect. nov.

Plantae epiphyticae vel saxicolae. *Rhizoma* breve, repens. *Caules* contigui, erecti, basi in pseudobulbos parvos incrassati, superne graciles, sub anthesi aphylli sed per totam longitudinem foliorum vaginis obtecti. *Foliorum* laminae non

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[53] By V. S. Summerhayes, Royal Botanic Gardens, Kew.

visae. *Inflorescentiae* simpliciter racemosae, pluri- ad multiflorae. *Flores* parvuli, glabri vel pubescentes, labello perlato ecalloso ± dense farinaceo-pubescenti.

Species 2 adhuc notae, Africae orientalis indigenae. Species typica sectionis, *P. eurychila* Summerh.

When I described *P. eurychila* (Kew Bull. 1939, 492) I pointed out that it lacked the prominent hair-cushions on the lip which are such a striking feature of sect. *Elasticae* in which I had placed it. I also drew attention to the fact that it was the only species of the section known from eastern Africa. The discovery of a further species, described below, from Nyasaland, agreeing with *P. eurychila* in many important features, has confirmed my suspicions that the latter is not properly placed in sect. *Elasticae.* I am therefore creating a new section to contain the two species. The new section shows certain affinities in habit and floral structure with the predominantly East African sections *Isochiloideae* and *Dendrobianthe.* It differs from the former in the general floral structure, particularly the lip shape, and in the absence of capitate or clavate hairs, and from the latter in the different inflorescence, firmer texture of the flowers, and lip shape.

Polystachya brassii Summerh., sp. nov.

Affinis *P. eurychilae* Summerh., a qua statura multo minore, inflorescentiis paucifloris, sepalis pubescentibus mento pro rata breviore, labelli lobo intermedio majore, ovario dense pubescenti satis differt.

Herba nana, epiphytica vel saxicola, sub anthesi aphylla. *Caules* approximati, erecti, 1.5–3 cm. alti, inferne in pseudobulbos conicos vel ovoideos 3–11 mm. altos incrassati, foliorum vaginis paleaceis demum in fibras solutis imbricantibus omnino obtecti, basi radices flexuosas ramosas graciles griseas emittentes. *Folia* juvenilia tantum visa; lamina ± 3 mm. longa, apice rotundata. *Inflorescentiae* simpliciter racemosae, circiter 10 mm. longae, 4–5-florae; pedunculus vaginis 1–2 lanceolatis acutis ± hyalinis instructus; rhachis ± 5 mm. longa, dense pubescens; bracteae lanceolatae vel ovatae, cuspidato-acuminatae, 1.5–3 mm. longae, ± hyalinae, glabrae. *Flores* patentes vel erecto-patentes, purpureo- vel viridi-albi, labello flavido; pedicellus cum ovario 2–3 mm. longus, dense patentim pubescens. *Sepalum* intermedium ellipticum vel elliptico-ovatum, apice obtusum vel rotundatum, 4.5–5 mm. longum, 2.5–3.25 mm. latum; sepala lateralia oblique ovata, apice acuta vel obtusa, margine antico (superiore) circiter 6 mm. longa, basi 2.75–3.25 mm. lata, cum pede columnae mentum obtusum 1.75–2.5 mm. longum formantia; sepala omnia extra sparse pubescentia, quinquenervia. *Petala* oblonga vel subspathulato-oblanceolata, obtusa, 4–5.25 mm. longa, 1.25–2 mm. lata, uni- vel subtrinervia, glabra. *Labellum* ex ungue brevissimo ambitu ± transverse oblongum vel ellipticum, antice trilobatum, totum 4.75–5.5 mm. longum, 7–7.5 mm. latum, marginibus exceptis ± dense farinaceo-puberulum vel pubescens, ecallosum; lobus intermedius semi-orbicularis, rotundatus, 1.75–2 mm. longus, 3–3.3 mm. latus; lobi laterales patentes vel leviter incurvati, semi-orbiculari-oblongi, rotundati, antice circiter 2 mm. longi. *Columna* erecta vel ± incurvata, subteres, 2.5–3 mm. alta, androclinio leviter excavato; anthera hemisphaerica, antice haud producta; pollinia 4, ovoidea vel oblonga, per paria arcte compressa, 1–1.25 mm. longa, viscidio fere orbiculari 0.75 mm. lato; fovea stigmatica quadrata.

Kota-kota District: Chenga Hill, amongst dry mosses and lichens on a shaded rock, sepals very pale purple, petals white, lip yellowish-green edged with white, 1600 m., Sept. 9, 1946, *17604* (TYPE); among mosses and lichens on a dry shaded rock, flowers greenish-white, *17605.* Cholo District: Cholo Mountain, epiphytic on exposed trunk of rain-forest tree, sepals purplish-white, petals white, lip pale yellow edged with white, column green, 1200 m., Sept. 26, 1946, *17830.* Nyasaland.

This remarkable little species agrees well in general characters with *P. eurychila* Summerh. but differs as indicated in the diagnosis. In two of the gatherings there are no leaf laminas but only the dried-up sheaths, but in *17830* the new leaves are just appearing. They are not developed enough, however, for us to be able to say for certain how many there will be on each stem or of what shape they will be when mature.

Polystachya vaginata Summerh. Kew Bull. **1947**: 130. 1948.

Kota-kota District: Chenga Hill, common epiphyte on low trees among dry rocks, sepals brownish-green, petals yellowish-green, 1600 m., Sept. 9, 1946, *17610.* Cholo District: Cholo Mountain, high epiphyte in rain forest, sepals green, flushed with red, petals greenish-yellow, 1300 m., Sept. 24, 1946, *17793.*

The discovery of a species of sect. *Isochiloideae* in Nyasaland is of considerable interest, as the section was previously known only from Tanganyika Territory and Kenya Colony. There is, however, in the Kew Herbarium a scrap, which appears to belong to this section, from near Abercorn in Northern Rhodesia.

Bulbophyllum encephalodes Summerh. Bot. Mus. Leafl. **14**: 228. 1951.

Cholo District: Cholo Mountain, epiphyte in rain forest, flowers green with maroon markings, 1100 m., Sept. 29, 1946, *17871.* Uganda and Kenya Colony, southwards to N. Rhodesia.

Eulophia orthoplectron (Reichenb. f.) Summerh. Kew Bull. **1939**: 499. 1939.

Dedza, terrestrial in *Brachystegia* woodland, sepals purplish brown, petals red above, sulphur yellow below, lip yellow, lateral lobes faintly streaked with purple, column greenish white, 1500 m., Sept. 13, 1946, *17639.* Blantyre, in *Brachystegia* woodland, sepals purple-red, petals red above, yellow below, lip yellow, column greenish-white 1000 m., Sept. 18, 1946, *17641.* East Africa, from southern Sudan to S. Rhodesia and Mozambique.

Tridactyle tridactylites (Rolfe) Schlechter, Beih. Bot. Centralbl. **36^2**: 148. 1918.

Kota-kota District: Chenga Hill, in semi-shade on dry rock, flower greenish-brown, 1600 m., Sept. 9, 1946, *17603.* Generally in Tropical Africa (except Kenya Colony), southwards to Angola, N. Rhodesia, and Nyasaland.

ZINGIBERACEAE

Aframomum sp. no. 1.

Cholo District: Cholo Mountain, in rain-forest regrowths, herb about 1.5 m. high, fruit orange-red, sour, 1200 m., Sept. 24, 1946, *17774*.*

Without seeing flowers, I hesitate to name this specifically. The entire ligule with the petiole rather exceeding it suggests that *17774* may be the same as plants occurring in East Africa, Madagascar, and the Mascarenes named *Aframomum angustifolium* (Sonn.) K. Schum. Pflanzenreich **20**(4^{46}): 218 (1904) (*Amomum angustifolium* Sonn. Voy. Ind. Or. **3**: 276. 1782).

Aframomum sp. no. 2.

Cholo District: Cholo Mountain, gregarious in rain-forest regrowths, and under open canopy in primary forest, herb 2.5–3 m. high, fruit red, palatable, eaten by the natives, 1200 m., Sept. 24, 1946, *17777.*

This is not, I believe, the same species as *17774*; it has the same sort of ligule, but differs in that the petiole is scarcely longer than it, and the midrib is puberulous not glabrous beneath. *A. zambesiacum* (Bak.) K. Schum. has a similar midrib, but a longer petiole, and also a peduncle 30 cm. long or more, not onlv 4–5 cm. as in *17777.*

It is not possible at present to name with certainty many specimens of this important and interesting genus. This is largely due to imperfect material. The flowers and fruits are produced at different times, and frequently the flowers are accompanied only by very young leaves. I commend the study of this genus to botanists resident in Nyasaland and elsewhere, who are willing to take the trouble to collect from marked plants at different seasons, preserving flowers in spirit, and trying to find by observation how much the species vary in the field.

MUSACEAE[54]

Ensete edule Horan. ["Bruce"], Prodr. Scitam. 41. 1862; Cheesman, Kew Bull. **1947**: 100. 1948.

Musa ensete J. F. Gmel. Syst. Nat. **2**: 567. 1791.

Cholo District: Cholo Mountain, common in gullies in rain-forest, herb 4–6 m. high, "stem" much tapered upward, up to 40–50 cm. thick at base, dark purple, leaves few, up to about 2 m. long, lamina equal at base, glaucous beneath, panicle pendent, fruiting part 40 cm. long, sterile part 45 cm. long, flowers dirty white, bracts purple-red, glaucous, deeply wrinkled transversely, fruit immature, laterally compressed, 1200 m., Sept. 25, 1946, *17795*. French Cameroons, French Congo, Belgian Congo, Anglo-Egyptian Sudan, Abyssinia, Uganda, Kenya, Tanganyika Territory, Portuguese East Africa, Nyasaland, and S. Rhodesia.

IRIDACEAE

Dietes prolongata (Bak.) N. E. Br. Jour. Linn. Soc. Bot. **48**: 37. 1928.

Moraea iridioides L. var. *prolongata* Hort. Leichtl. ex Bak. in Thiselton-Dyer, Fl. Cap. **6**: 26. 1896.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common in forest on open river-banks, herb 50 cm. high, flowers white, only one plant found in flower, 1750 m., July 5, 1946, *16664**. Cholo District: Cholo Mountain, occasional in rain-forest undergrowth, 1400 m., Sept. 27, 1946, *17840**. Cholo, shady banks of streams, herb, sepals white, crests yellow, petals pale lavender, stigmas pale lavender, 900 m., Sept. 30, 1946, *17877**. Kenya, Tanganyika Territory, Portuguese East Africa, Nyasaland, N. and S. Rhodesia, and South Africa.

Although N.E. Brown (l.c.) stresses the whiteness of the flowers of *D. prolongata*—and certainly the notes of most collectors state that the flowers of this species are merely white—yet the sheet at Kew of *Rudatis 1441*, cited by Brown and with a determination-label affixed written in his own hand, says that the flowers were white with a yellow spot.

Moraea[55] **schimperi** (Hochst.) Pichi-Sermolli, Webbia **7**: 349. 1950.

Hymenostigma schimperi Hochst. Flora **27**: 24. 1844.
Vieusseuxia schimperi Hochst. ex A. Rich. Tent. Fl. Abyss. **2**: 305. 1850–1851.
Iris diversifolia Steud. ex A. Rich. Tent. Fl. Abyss. **2**: 305. 1850–1851, nom. nud., pro syn.
Xiphion diversifolium Klatt, Linnaea **34**: 572. 1865–1866, cum descr., nom. illegit.
Moraea diversifolia (Klatt) Bak. Jour. Linn. Soc. Bot. **16**: 130. 1877; in Thiselton-Dyer, Fl. Trop. Afr. **7**: 339. 1898.

Dedza District: Dedza, common and conspicuous in moist depressions in *Brachystegia* woodland, perennial herb 30–40 cm. high, flowering after the burning of the grass, flowers lavender, crests of sepals yellowish-white, 1500 m., Sept.

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[54] Determined by E. Milne-Redhead, Royal Botanic Gardens, Kew.

[55] Although N. E. Brown (Jour. Linn. Soc. Bot. **48**: 40, 41. 1928) adopts the earlier spelling *Morea* Mill. (Fig. Pl. **2**: 159. *pl. 238*. 1758), yet *Moraea* L. (1762) is conserved against *Morea* Mill. (1758), and the former must be used.

13, 1946, *17632*. Anglo-Egyptian Sudan, Abyssinia, Tanganyika Territory, Portuguese East Africa, Nyasaland, N. and S. Rhodesia, and Angola; also in Nigeria (Bauchi Plateau) and the British Cameroons (Bamenda).

Moraea thomsoni Bak. Handb. Irid. 57. 1892; in Thiselton-Dyer, Fl. Trop. Afr. **7**: 341. 1898.

Kota-kota District: Chintembwe, common on rocky grassland, perennial herb 20–30 cm. high, flowers purplish-white, opening after sundown, 1400 m., Sept. 9, 1946, *17579*. Abyssinia, Uganda, Kenya, Tanganyika Territory, and Nyasaland.

Hesperantha petitiana (A. Rich.)[56] Bak. Jour. Linn. Soc. Bot. **16**: 96 (1877) var. **volkensii** (Harms) R. C. Foster, Contr. Gray Herb. **166**: 22. 1948.

Hesperantha volkensii Harms, Bot. Jahrb. **19** (Beibl. 47): 28. 1894; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **7**: 349. 1898.

North Nyasa District: Nyika Plateau, sporadic on banks of a grassland stream, perennial herb 15–35 cm. high, erect from a globose corm 6–7 mm. in diameter, flowers pink, 2300 m., Aug. 14, 1946, *17230*. The type in Abyssinia, the variety in Uganda, Kenya, Tanganyika Territory, and Nyasaland.

Dierama vagum N.E.Br. Jour. Roy. Hort. Soc. **54**: 200. 1929; Weim. Bot. Notiser **1937**: 175. 1937.

Mlanje District: Mlanje Mountain; southwest ridge, one example on grassy bank of a stream, herb 70 cm. high, leaves erect, bulb enclosed in fibrous remains of former stems, flowers pink, showy, 2120 m., June 28, 1946, *16521**; Luchenya Plateau, scattered on open grasslands, herb about 1 m. high, flowers delicate pale purple, 2100 m., July 2, 1946, *Anthony 16610**; ibid., frequent in grasslands, herb 75 cm. high, only an occasional plant in flower, flowers pale pinkish-purple, 2200 m., July 3, 1946, *16651**; ibid., frequent in grasslands, herb 50–60 cm. high, seldom flowering, flowers rose-pink, showy, 2000 m., July 9, 1946, *16756**; ibid., common in grasslands, but seldom flowering, flowers rose-pink, 2100 m., July 11, 1946, *16786**. Uganda, Kenya, Tanganyika Territory, Nyasaland, and S. Rhodesia.

Lapeyrousia grandiflora (Bak.) Bak. Bot. Mag. *pl. 6924*. 1887; in Thiselton-Dyer, Fl. Trop. Afr. **7**: 355. 1898.

Anomatheca grandiflora Bak. Jour. Bot. **14**: 337. 1876.

Cholo District: Nswadzi River, scattered on shaded river-banks, perennial herb, 40–80 cm. high, flowers red, conspicuous, native name nangulungundi, 840 m., Sept. 27, 1946, *17843*. Portuguese East Africa, Nyasaland, S. Rhodesia, and the Transvaal.

Crocosmia aurea (Pappe ex Hook.) Planch. Fl. Serres *pl. 702*. 1851–1852; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **7**: 355. 1898.

Tritonia aurea Pappe ex Hook. Bot. Mag. *pl. 4335*. 1847.

North Nyasa District: Nyika Plateau, occasional in juniper-forest undergrowth, herb about 1 m. high, capsule orange, seeds black, 2250 m., Aug. 11, 1946, *17180*. Eastern Africa from Uganda southwards to South Africa.

Gladiolus zambesiacus Bak. Handb. Irid. 212. 1892; in Thiselton-Dyer, Fl. Trop. Afr. **7**: 364. 1898.

Zomba District: Zomba Plateau, protruding above the grass on precipitous rocky sides of a bluff, herb 50–75 cm. high, flowers pale pink, 1430 m., May 29, 1946, *16076**; ibid., occasional on moist grassy slopes, herb, flowers pale pink, 1500 m., June 5, 1946, *16246**; ibid., occasional on moist grassy slopes, herb

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[56] *Ixia petitiana* A. Rich. Tent. Fl. Abyss. **2**: 309. 1850–1851.

50 cm. high, flowers white, the sepals tinged with pink, 1500 m., June 5, 1946, *16248**. Portuguese East Africa and Nyasaland.

G. zambesiacus is very closely related to *G. laccatus* Thunb. Prodr. Pl. Cap. 186 (1800; N.E.Br. Jour. Linn. Soc. Bot. **48**: 24. 1928. *G. villosus* Ker-Gawl. Irid. Gen. 133. 1827; Bak. in Thiselton-Dyer, Fl. Cap. **6**: 149. 1896).

G. laccatus comes from the Coast Region of South Africa. *G. zambesiacus* has the leaf-sheaths, and often the produced leaves also, puberulous with a short down which scarcely overtops the longitudinal ribs among which it lies, while *G. laccatus* is pubescent or pilose with much longer hairs which are usually more abundant than the downiness of *G. zambesiacus*.

Gladiolus crassifolius Bak. Jour. Bot. **14**: 334. 1876; in Thiselton-Dyer, Fl. Cap. **6**: 150. 1896; Weim. Bot. Notiser **1937**: 179. 1937.

Gladiolus gazensis Rendle, Jour. Linn. Soc. Bot. **40**: 210. 1911.

Mlanje District: Mlanje Mountain; west slope, one plant in open grassland, herb 50 cm. high, flowers purple, 1830 m., June 21, 1946, *16401**. Portuguese East Africa and S. Rhodesia, southwards to South Africa; not previously recorded from Nyasaland, but a hitherto unnamed specimen at Kew (*G. Adamson 336*, Mlanje Mountain) is the same species.

Gladiolus psittacinus Hook. Bot. Mag. *pl. 3032*. 1830.

Gladiolus quartinianus A. Rich. Tent. Fl. Abyss. **2**: 306. 1850–1851; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **7**: 371. 1898.

Blantyre District: Blantyre, in *Brachystegia* woodlands, 80 cm. high, flowers coral-rose, 1100 m., June 17, 1946, *16345**. Widespread in tropical and South Africa.

For a note on the naming and variation of this species see Weimarck, Bot. Notiser **1937**: 180 (1937).

Gladiolus sp. ?

Mlanje District: Mlanje Mountain, one example on open bank of forest stream, perennial herb 130 cm. high, one stem, erect, flowers white, conspicuous, July 5, 1946, *16669**.

This is a perplexing and unfortunately unicate specimen.

It is near to *G. bellus* C. H. Wright, Kew Bull. **1906**: 169 (1906), whose type-locality is Mlanje Mountain, and which has also been discovered on the Zomba Plateau. The Vernay Nyasaland Expedition did not refind *G. bellus. Brass 16669* differs from *G. bellus* in its broader leaves 1–1.5 cm. wide (not 0.4–0.6 cm. as in *G. bellus*), and longer corolla-tube 8–9 cm. long (not 3.5–5 as in *G. bellus*), pure white and not marked with light purple.

As far as flowers and foliage are concerned *16669* might well be referred to the genus *Acidanthera*, although I cannot exactly match it there. It comes nearest to *A. aequinoctialis* (Herb.) Bak. Jour. Linn. Soc. Bot. **16**: 160 (1877); in Thiselton-Dyer, Fl. Trop. Afr. **7**: 358 (1898; *Gladiolus aequinoctialis* Herb. in Lindl. Bot. Reg. **1842**: Misc. 85. 1842). *Brass 16669* differs from *A. aequinoctialis*, which comes from Sierra Leone, in the more pronounced cartilaginous margins to the leaves and, judging from Mr. Brass' notes, in the flowers' lacking a mauve centre.

All this, of course, adds weight to Miss G. J. Lewis' opinion that *Acidanthera* cannot be upheld as a genus distinct from *Gladiolus* (see Jour. S. Afr. Bot. **7**: 25. 1941). I must here thank my colleague Mr. R. B. Drummond who has drawn my attention to Miss Lewis' paper, and has also kindly given me his view on *Brass 16669*.

I commend the refinding of this plant to any naturalists who may visit Mlanje Mountain. The lax spike of spectacular white flowers with long slender corolla-tubes broadening into a funnel-shaped limb 4 cm. long should make this plant hard to overlook.

An unnamed specimen at Kew, *Adamson 361*, also from Mlanje Mountain, is the same as *Brass 16669*.

HYPOXIDACEAE

Hypoxis nyasica Bak. Kew Bull. **1897**: 284. 1897; in Thiselton-Dyer, Fl. Trop. Afr. **7**: 380. 1898; Nel, Bot. Jahrb. **51**: 318. 1914.

Cholo District: Cholo; Cholo Mountain, in *Brachystegia* woodlands, herb, flowers yellow, native name (Chinyanja) chinganana, 840 m., Sept. 29, 1946, *17860*. Nyasaland and ? Portuguese East Africa.

Hypoxis ? canaliculata Bak. Trans. Linn. Soc. II. Bot. **1**: 265. 1878; in Thiselton-Dyer, Fl. Trop. Afr. **7**: 379. 1878; Nel, Bot. Jahrb. **51**: 324. 1914; Norlindh, Bot. Notiser **1937**: 166. 1937.

Kota-kota District: Chenga Hill, sporadic in low open *Brachystegia* woodland, perennial herb, flowers yellow, 1600 m., Sept. 9, 1946, *17598*.

H. canaliculata is known from N. and S. Rhodesia and Angola. If *17598* is correctly named (mature foliage is wanted for certainty) then it is new to Nyasaland.

VELLOZIACEAE

Vellozia splendens Rendle, Trans. Linn. Soc. II. Bot. **4**: 49. *pl.* 8. 1894; Greves, Jour. Bot. **59**: 283. 1921.

Vellozia kirkii Hemsl. Bot. Mag. *pl. 7962*. 1904; Greves, Jour. Bot. **59**: 283. 1921.

Zomba District: Zomba Plateau, common in crevices of exposed dry rocky summit; shrub to 2 m. high, freely branched from a short erect stem, soft fibrous stem used for scouring-brushes by natives, leaves drooping, fruit remains only, apparently a capsule, native name (Chinyanja) cheyo, 1820 m., May 31, 1946, *16144*. Mlanje District: Mlanje Mountain; Luchenya Plateau, abundant on rocks and on shallow rocky soil in grasslands from about 2000 to 2300 m., tree or shrub 1–5 m. high, stems thickly coated with fibrous roots, the whole often 30 cm. thick near base, 2150 m., July 11, 1946, *16796*. Endemic to Nyasaland.

PHILESIACEAE

Behnia reticulata (Thunb.) Didr. Viddensk. Meddel. Kjöben. **1854**: 183. 1854; Bak. in Thiselton-Dyer, Fl. Cap. **6**: 274. 1896.

Ruscus reticulatus Thunb. Prodr. Pl. Cap. 13. 1794.

Mlanje District: Likubula-Tuchila Divide, primary forest undergrowth, vine 3 m. high, fruit purplish, 2000 m., July 9, 1946, *16763*. Portuguese East Africa, Nyasaland (for which this is the first record), S. Rhodesia, and southwards to South Africa.

Fruiting specimens in the herbarium are usually described as having cream or yellowish fruits. The colour may vary, a possibility for observers of the living plant to bear in mind.

AGAVACEAE

Dracaena ? fragrans (L.) Ker-Gawl. Bot. Mag. *pl. 1081*. 1808.

Aletris fragrans L. Sp. Pl. ed. 2. 456. 1762.

Kota-kota District: Nchisi Mountain, gregarious on slopes of ravines in rain-forest, shrub 1.5–2 m. high, stem simple, erect or ascending, leaves numerous, smooth and shining, midrib whitish beneath, fruits fleshy, orange-yellow, native name (Chinyanja) ndiapimba, 1550 m., July 30, 1946, *17030**. *D. fragrans* is widely distributed in the forest areas of tropical Africa, but has so far not been correctly recorded from Nyasaland.

Further and better specimens, with flowers, are wanted for complete certainty.

Baker in Thiselton-Dyer, Fl. Trop. Afr. **7**: 441 (1898) cites under *D. fragrans* some specimens from Nyasaland; none was rightly named, all being *D. steudneri* Engl. I have little doubt that the same comment applies to the mention of *D. fragrans* in Burtt Davy & Hoyle, Check-Lists For. Trees & Shrubs Brit. Emp. **2** (Nyasaland): 48 (1936). There is no doubt that *17030* is not *D. steudneri*.

Dracaena steudneri Engl. Pflanzenw. Ost-Afr. **C**: 143. 1895.

Dracaena fragrans sensu Bak. in Thiselton-Dyer, Fl. Trop. Afr. **7**: 441. 1898, quoad spec. nyasana; non *D. fragrans* (L.) Ker-Gawl.

Kota-kota District: Nchisi Mountain, in open places in rain-forest, tree up to about 15 m. high, sparingly branched, leaf-margins white, flowers yellowish-green, in large erect panicles over 1 m. long, 1500 m., Sept. 11, 1946, *17614*. Anglo-Egyptian Sudan, Belgian Congo, Uganda, Kenya, Tanganyika Territory, Portuguese East Africa, Nyasaland, S. Rhodesia, and Angola.

Dracaena laxissima Engl. Bot. Jahrb. **15**: 478. 1893.

Dracaena elliptica sensu Bak. in Thiselton-Dyer, Fl. Trop. Afr. **7**: 446. 1898; Burtt Davy & Hoyle, Check-Lists For. Trees & Shrubs Brit. Emp. **2** (Nyasaland): 48. 1936; non *D. elliptica* Thunb. & Dalm.

Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent in primary forest undergrowth, shrub, several arched stems up to 7–8 m. long, 1890 m., July 12, 1946, *16806*. Widespread in the forest areas of tropical Africa.

Dracaena afro-montana Mildbr. Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exp. 1907–1908 **2**: 62. *pl. 5, A–E*. 1910.

North Nyasa District: Nyika Plateau, occasional in montane forest undergrowth, shrub 2–3 m. high, fruits green, 2250 m., Aug. 16, 1946, *17272**. Eastern and central tropical Africa from the Anglo-Egyptian Sudan (Imatong Mountains) southwards to Nyasaland.

LILIACEAE

Asparagus virgatus Bak. in Saund. Ref. Bot. **3**: *pl. 214*. 1870; in Thiselton-Dyer, Fl. Trop. Afr. **7**: 426. 1898.

Zomba District: Zomba Plateau, edges of second-growth rain-forest, not common, herb about 1.5 m. high, slender, weak, 1500 m., June 5, 1946, *16263*. Portuguese East Africa, Nyasaland, S. Rhodesia, and South Africa; according to Weimarck (Bot. Notiser **1937**: 445, 446. 1937) it extends to Kenya, though I have not seen specimens from there.

Asparagus plumosus Bak. Jour. Linn. Soc. Bot. **14**: 613. 1875; in Thiselton-Dyer, Fl. Trop. Afr. **7**: 430. 1898.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common in open parts of primary forest, slender scrambling species 2–3 m. high, little branched, rarely fertile, 1800 m., July 8, 1946, *16729**. Kota-kota District: Nchisi Mountain, among rocks in *Brachystegia* woodland, shrub 1.5 m. high, subscandent, native name (Chinyanja) sisilamanda, 1550 m., July 26, 1946, *16955*. Cholo District: Cholo Mountain, occasional in both primary and secondary rain-forest, scrambling shrub about 2 m. high, fruit black, 1200 m., Sept. 21, 1946, *17722*. (? Abyssinia and Somaliland,) Kenya and Tanganyika Territory, southwards to South Africa.

Asparagus racemosus Willd. Sp. Pl. **2**: 152. 1799; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **7**: 434. 1898.

Zomba District: Zomba Plateau, one plant in open woodlands, herb 1.5 m. high, stem solitary, erect, flowers white, fruit unripe, 1400 m., May 28, 1946, *16041*. Widespread in tropical Africa, extending to the Transvaal, with a variety in South Africa; the species also in tropical Asia.

I am taking *A. racemosus* in a wide sense, including *A. buchanani* Bak. Kew Bull. **1893**: 211 (1893); in Thiselton-Dyer, Fl. Trop. Afr. **7**: 434 (1898). At present I do not feel that *A. racemosus* and *A. buchanani* are specifically separable.

Asparagus sp. nr. **racemosus** Willd. Sp. Pl. **2**: 152. 1799.

Zomba District: Zomba Plateau, occasional in exposed rocky situations, shrub about 1.5 m. high, stem solitary, erect and slightly arched, fruit red, fleshy, globose, about 6–8 mm. in diameter, 1500 m., June 3, 1946, *16171*.

This equals *Purves 66* (Herb. Kew.) collected in Dec. 1900 at 1830 m. on Zomba Hill, said to be found on rocks and usually to have a long single stem 1.2–1.5 m. long. More material is wanted, including flowers.

This plant is remarkable for the length (3–5 cm.) of its mature cladodes. It rather resembles the little-known *A. longicladus* N.E. Br. Kew Bull. **1921**: 298 (1921), from the Victoria Falls; but the Nyasaland plant has glabrous not pubescent stems, and may perhaps differ in the inflorescence.

Asparagus spp.

Kota-kota District: Nchisi Mountain, occasional among rocks in *Brachystegia* woodland, shrub about 1 m. high, erect, native name (Chinyanja) sisilamanda, 1500 m., July 26, 1946, *16960*. North Nyasa District: Nyika Plateau, common in grassland shrubberies and on edges of montane forest, sterile, 2340 m., Aug. 19, 1946, *17337*.

In the absence of flowers I cannot certainly identify the above two numbers, which are probably not conspecific.

Kniphofia ensifolia Bak. Jour. Bot. **23**: 278. 1885; in Thiselton-Dyer, Fl. Cap. **6**: 280. 1896; Berger, Pflanzenreich **33**($4^{38(3-2)}$): 45. 1908.

Kniphofia tuckii Hort. Leichtl. ex Bak. Gard. Chron. III. **13**: 68. 1893; Bak. in Thiselton-Dyer, Fl. Cap. **6**: 278. 1896; Berger, Pflanzenreich **33**($4^{38(3-2)}$): 56. 1908.

Kniphofia rivularis Berger, Pflanzenreich **33**($4^{38(3-2)}$): 55. 1908; R. A. Dyer, Fl. Pl. S. Afr. **22**: *pl.* 866. 1942.

Zomba District: Zomba Plateau, common in open grassy situations on loamy creek flats, herb 1.5–3 m. high, rhizome branched, leaves many, weak, glaucous, V-shaped in cross-section, used by natives for tying material, the inflorescence cylindric-conic, very showy, flowers red in bud, yellow when open, scape solitary, erect, the lower two-thirds with withered bracts, fruit unripe, 1500 m., June 8, 1946, *16323*. New to Nyasaland; previously known from Bechuanaland, the Transvaal, and South Africa.

In making these three species synonymous, I follow manuscript notes by Miss E. A. Bruce in Herb. Kew. and her published note in Bothalia **6**: 231 (1951). The type-specimen of *K. ensifolia* is very poor indeed, but Mr. Brass' plant is a very good fit for *K. rivularis*, except for the rather longer inflorescences up to 22 cm. long.

Kniphofia sp.

Mlanje District: Mlanje Mountain; Luchenya Plateau, scattered in open grasslands, perennial herb about 2 m. high, leaves contain a very strong fibre, cf. collection from Zomba Plateau, 1960 m., July 15, 1946, *16850**.

This may well be *K. ensifolia* Bak. and conspecific with *16323*, but as the most important characters are floral, and *16850* is in fruit, I feel that it is best left unnamed. No flowering *Kniphofia* that could correspond with *16850* has so far been collected on Mlanje Mountain.

Aloë buchanani Bak. Kew Bull. **1895**: 119. 1895; in Thiselton-Dyer, Fl. Trop. Afr. **7**: 457. 1898; Christian, Fl. Pl. S. Afr. **20**: *pl. 763*. 1940.

Zomba District: Zomba Plateau, occasional in *Brachystegia* woodlands, perennial herb about 1 m. high, leaves weak and spreading, channelled, fleshy, green, mottled with white, roots tuberous, peduncle erect, flowers brownish-pink, tipped with green, 1500 m., June 4, 1946, *16228*. Confined to Nyasaland.

Aloë nuttii Bak. Hook. Ic. Pl. *pl. 2513*. 1897; in Thiselton-Dyer, Fl. Trop. Afr. **7**: 457. 1898; Berger, Pflanzenreich **33**($4^{38(3-2)}$): 170. 1908; Christian, Fl. Pl. S. Afr. **20**: *pl. 762*. 1940.

North Nyasa District: Nyika Plateau; Nchena-chena Spur, common in short grass of slopes, shrub 60–80 cm. high, leaves pale green, spotted with white, whole inflorescence orange-red except for green tips of sepals and petals, 2000 m., Aug. 10, 1946, *17147*; ibid., common in open grassland, shrub 70–100 cm. high, underside of leaves mottled with white at base, flowers orange-red, apex of petals and sometimes of sepals green, 2000 m., Aug. 20, 1946, *17369*. Tanganyika Territory, Nyasaland, and N. Rhodesia.

Aloë sp. nr. **lateritia** Engl. Pflanzenw. Ost-Afr. **C**: 140. 1895.

North Nyasa District: Nyika Plateau, gregarious on dry rocks in grassland, shrub 35–50 cm. high, stem simple, very short, leaves purplish-brown, incurved and forming a cup-shaped rosette, flowers and pedicels orange-red, peduncle brownish-purple, covered with a glaucous bloom, simple or once-forked, erect, fruit 3-angled, soft, up to 2.5 cm. long and 1.5 cm. in diameter, 2250 m., Aug. 11, 1946, *17184*.

This differs from *A. lateritia* (Tanganyika Territory) in the inflorescence which is simple or only once branched, and in the leaves which form a cup-shaped rosette; it also resembles *A. duckeri* Christian, but likewise differs in that the inflorescence does not have 5–6 branches as in that species.

Aloë chabaudii Schönl. Gard. Chron. III. **38**: 102. *f. 34* (1905) var. **mlanjeāna** Christian, Fl. Pl. S. Afr. **18**: *pl. 698*. 1938; Reynolds, Aloes S. Afr. 342. 1950.

Mlanje District: Mlanje Mountain, plentiful in both wet and dry situations on open rock-faces, 50–80 cm. high, leaves in a basal rosette, very thick and fleshy, numerous, curved upward and surrounding the panicle, panicle about 35–50 cm. long, not much exceeding the leaves, branches spreading, flowers yellow to orange or red on different plants, a very attractive species (colour photos.), 1420 m., June 24, 1946, *16411*. The var. only on Mlanje; the species in Portuguese East Africa, Nyasaland, N. and S. Rhodesia, the Transvaal, and Swaziland.

I do not feel quite certain that Mr. Brass' plant is the variety.

Aloë cameronii Hemsl. Bot. Mag. *pl. 7915*. 1903; Berger, Pflanzenreich **33**($4^{38(3-2)}$): 263. *f. 102, A–D*. 1908.

Kota-kota District: Nchisi Mountain, gregarious on rocks in *Brachystegia* woodland, shrub 1–1.5 m. high, stem simple, suberect, ascending or pendent, 3–4 cm. in diameter, leaves reddish, very thick and fleshy, horizontally placed on the stem (not in a rosette), peduncle erect, reddish, usually once forked, flowers red, apex of lobes greenish-yellow, 1600 m., July 27, 1946, *16991.* Nyasaland and N. Rhodesia.

Aloë arborescens Mill. Gard. Dict. ed. 8. no. 3. 1768; Berger, Pflanzenreich **33**($4^{38(3-2)}$): 288. 1908; Reynolds, Aloes S. Afr. 407. 1950.

Mlanje District: Mlanje Mountain; southwest ridge, common and conspicuous on or amongst rocks, tree or shrub 2–5 m. high, stem branched, leaves falcate, sometimes very strongly so (colour photos.), perianth red, tipped with green, filaments yellow, anthers orange, peduncle ascending from the rosette of leaves, 2400 m., June 28, 1946, *16525.* Nyasaland and N. Rhodesia, southwards to South Africa.

Aloë chimanimaniënsis Christian, Fl. Pl. S. Afr. **16**: *pl. 639.* 1936; Reynolds, Aloes S. Afr. 220. 1950.

Kota-kota District: Nchisi Mountain, frequent in semi-shade in rain-forest, shrub 140 cm. high, stem simple, erect, 20 cm. long and 7 cm. in diameter, leaves to 65 cm. long, flaccid, thick and fleshy, pale green, flower-segments pale red with paler margins and yellowish tips, peduncle ascending, 70 cm. long, panicle 120 cm. long, branches 8, ascending, 1400 m., July 29, 1946, *Vernay 17029.* Nchisi, occasional in gullies in *Brachystegia* woodland, shrub about 2 m. high, stem erect, unbranched, leaves to 90 cm. long, flaccid, green, mottled with white, inflorescence 160 cm. long, peduncle 90 cm. long, purplish, glaucous, flowers orange-red with greenish-yellow tips, fruit inflated, immature, green, 1350 m., Aug. 1, 1946, *17083.* New to Nyasaland; previously known from S. Rhodesia and the Transvaal.

These plants seem to differ from *A. chimanimaniënsis* solely in the yellow or greenish-yellow tips to the flowers. *A. menyharthii* Bak. in Thiselton-Dyer, Fl. Trop. Afr. **7**: 459 (1898) is very close but has shorter pedicels only up to 18 mm. long.

Aloë christianii Reynolds, Jour. S. Afr. Bot. **2**: 171. *pl. 20.* 1936; Aloes S. Afr. 309. 1950.

Dedza District: Dedza, several examples in *Brachystegia* woodland, 2.5 m. high, stem thick, erect, simple, about 20 cm. high, leaves flat, spreading, stiff, all but the base deeply channelled, brownish-green, about 70 cm. long, inflorescence paniculate, peduncle thick, tapering, brownish-purple, branches ascending, flowers orange-red with yellowish tips (photos.), 1500 m., July 23, 1946, *16884.* Tanganyika Territory, Portuguese East Africa, Nyasaland, and N. and S. Rhodesia.

Aloë mawii Christian, Jour. S. Afr. Bot. **6**: 186. *pl. 23.* 1940, e descr. & icon.

Zomba District: Zomba Plateau, occasional on rocky open bluffs, in both very dry and very moist situations, shrub about 1.5 m. high, stem simple or once forked, leaves very fleshy, the margins on the whole blade reddish (photos.), peduncles reflexed, the flowering part more or less horizontal, peduncles below the flowers 40–60 cm. long, perianth orange-red, filaments purple, anthers orange, 1500 m., June 5, 1946, *16273.* Endemic to Nyasaland.

There is no material of this species at Kew for comparison.

Anthericum sp.

Zomba District: Zomba Plateau, one example on a shady rock-ledge, herb 40 cm. high, flowers white, 1500 m., June 2, 1946, *16157**.

Very possibly this is the same as *Purves 106* and *Lawrence 227* at Kew, both from Zomba. However *Brass 16157* is too incomplete for certainty, and since it is in flower there is even some doubt whether it is an *Anthericum* and not a *Chlorophytum*.

Chlorophytum glabriflorum C. H. Wright, Kew Bull. **1906**: 170. 1906.

Mlanje District: Mlanje Mountain; Luchenya Plateau, several plants in grassland sheltered by forest, perennial herb 1.5 to over 2 m. high, leaves channelled, lax, more or less fleshy, up to 100 cm. long and 5 cm. wide, flowers white, panicle up to 1.4 m. long, lowermost bracts over 80 cm. long, 1880 m., July 8, 1946, *16727*. Endemic to Mlanje; the last collection made was the type (*Purves 17*) in 1901.

Chlorophytum nidulans (Bak.) Brenan, comb. nov.

Anthericum nidulans Bak. Jour. Linn. Soc. Bot. **15**: 314. 1876; in Thiselton-Dyer, Fl. Trop. Afr. **7**: 492. 1898.

Chlorophytum asphodeloides C. H. Wright, Kew Bull. **1906**: 170. 1906.

Mlanje District: Mlanje Mountain; Luchenya Plateau, scattered on seepage-wet rocks in open grassland, perennial herb 30–50 cm. high, roots orange, flowers white, 1860 m., June 26, 1946, *16436*. Endemic to Nyasaland.

I cannot distinguish *Anthericum nidulans* and *Chlorophytum asphodeloides*, and the plant is a *Chlorophytum* rather than an *Anthericum*.

Chlorophytum sp.

Zomba District: Zomba Plateau, common on an exposed rocky summit, herb 40 cm. high, flower white, only one seen, 1820 m., May 31, 1946, *16128**.

This, except for being rather tall, exactly equals a specimen at Kew from Mlanje Mountain collected by G. Adamson, marked "mixed with 366." It may well be a new species, but more material is needed.

The leaves are linear, up to 30 cm. long and 4 mm. wide, usually tapering at base into a petiole, gradually attenuate towards the apex, glabrous except for close-set short hairs along the margins; the panicle is up to 20 cm. long, with 3–5 suberect or ascending branches, glabrous; pedicels 4–8 mm. long, articulated at or somewhat below the middle; flowers about 8 mm. long; fruits obovate-obcordate, 5–7 mm. long, 4–5 mm. wide.

Albuca kirkii (Bak.) Brenan, comb. nov.

Ornithogalum kirkii Bak. Jour. Linn. Soc. Bot. **13**: 279. 1873.

Albuca myogaloides Welw. ex Bak. Trans. Linn. Soc. II. Bot. **1**: 250. 1878; in Thiselton-Dyer, Fl. Trop. Afr. **7**: 529. 1898.

Albuca caudata sensu Bak. in Thiselton-Dyer, Fl. Trop. Afr. **7**: 529. 1898; non *A. caudata* Jacq. Ic. Pl. Rar. **2**: 20. *pl. 442*. 1786–1793.

Mlanje District: Likubula Gorge, occasional on bare ground in *Brachystegia* woodlands, 15–70 cm. high, sepals and petals green with white margins, 1200 m., June 21, 1946, *Vernay 16394*. Portuguese East Africa, Nyasaland, S. Rhodesia, and Angola.

I do not consider this plant to be conspecific with the South African *A. caudata* Jacq., which is more robust, with much larger perianths and longer pedicels.

Baker, in Thiselton-Dyer, Fl. Trop. Afr. **7**: 528 (1898), separated in his key *A. myogaloides* from *A. caudata* by the length of the perianth, about ½ inch in the former, ¾–1 inch in the latter. This works for the South African *A. caudata*, but for none of the tropical specimens that Baker cites, which are indistinguishable from *A. myogaloides* in perianth-size.

Specimens from Portuguese East Africa, including the type of *A. kirkii*, tend to have comparatively small flowers whose perianth-segments are 10–12 mm. long and 2.5–3 mm. wide; the specimens from Nyasaland and Angola, including the type of *A. myogaloides*, have rather larger flowers whose perianth-segments are

13–15 mm. long and 3.5–4 mm. wide. I can detect no other clear differences between these groups and I consider them conspecific, although perhaps varietally distinct.

Albuca ? nyikensis Bak. Kew Bull. **1897**: 286. 1897; in Thiselton-Dyer, Fl. Trop. Afr. **7**: 530. 1898.

Kota-kota District: Nchisi Mountain, sporadic in gullies in *Brachystegia* woodland, herb 1.5 m. high, leaves flaccid, involute, appearing tubular, bulb pinkish when cut, flower-segments green with broad white margins, 1400 m., July 29, 1946, *17015*. Nyasaland, and probably also in Portuguese East Africa.

Our plant has fewer-flowered inflorescences than typical *A. nyikensis*, and probably equals *Rogers 10267* in Herb. Kew. from Portuguese East Africa. At present there is too little material to know how important this discrepancy is.

Albuca ? pachychlamys Bak. in Thiselton-Dyer, Fl. Cap. **6**: 458. 1897.

Kota-kota District: Chenga Hill, shallow rocky soil in *Brachystegia* woodland, herb, bulb 3.5–6 cm. in diameter, segments pale brown with white margins, 1600 m., Sept. 9, 1946, *17606**. For geography, see note below.

Brass 17606 is conspecific with a few specimens at Kew from N. Rhodesia (Mumbwa, *Mrs. Macaulay 864*, Mazabuka, *Trapnell 515*) and Kenya (between Kibwezi and Chyulu Hills, *Teophilo 7592*). These specimens have the peduncle more pronouncedly geniculate below the inflorescence than in typical *A. pachychlamys* from the Transvaal and Swaziland. More material is wanted to see if it is really all one species.

Albuca melleri (Bak.) Bak. in Thiselton-Dyer, Fl. Trop. Afr. **7**: 532. 1898.

Ornithogalum melleri Bak. Jour. Linn. Soc. Bot. **13**: 280. 1873.

Kota-kota District: Chia area, common locally in sandy woodlands of lake-plain, perennial herb 30–60 cm. high, the first bulbous plant to appear after burning of the grass, bulb yellow, flower-segments green with yellowish-green margins, 480 m., Sept. 1, 1946, *17476*. Portuguese East Africa, Nyasaland, and S. Rhodesia, and possibly occurring further north.

Eucomis zambesiaca Bak. Gard. Chron. II. **25**: 9. 1886; in Thiselton-Dyer, Fl. Trop. Afr. **7**: 528. 1898.

Zomba District: Zomba Plateau, common in open grasslands, herb 30–40 cm. high, bulb brownish-black, shining, leaves fleshy, flaccid, spreading flat on the ground, flowers not seen, raceme surmounted by a cluster of yellow bracts, 1800 m., May 31, 1946, *16145*. Nyasaland and S. Rhodesia.

I cannot help suspecting that, when this genus is revised, the characters alleged to separate *E. zambesiaca* from *E. undulata* Ait. Hort. Kew. **1**: 433 (1789; see Baker's original description of *E. zambesiaca*) will be found insufficient. Certainly the length and density of the racemes and the length of the pedicels do not seem to work.

XYRIDACEAE

Xyris leptophylla Malme, Svensk Bot. Tidskr. **6**: 549. 1912.

Kota-kota District: Chia area, plentiful on moist grassy edges of marshes, herb 60–80 cm. high, leaves and scapes spirally twisted, flowers yellow, 480 m., Sept. 1, 1946, *17474*. Belgian Congo (Katanga), N. Rhodesia, and Nyasaland, for which this is the first record.

Xyris makuënsis N.E.Br. in Thiselton-Dyer, Fl. Trop. Afr. **8**: 17. 1901; Malme, Bot. Jahrb. **48**: 304. 1912.

Mlanje District: Mlanje Mountain; southwest ridge, gregarious in dense dark green beds in boggy bottom of a stream, 20–30 cm. high, flowers yellow, 2120 m., June 28, 1946, *16517*; Luchenya Plateau, common locally on seepage slopes in grasslands, herb 20–25 cm. high, flowers yellow, 1960 m., July 16, 1946, *16849*. Nyasaland (Mlanje) and Portuguese East Africa (Mamuli).

COMMELINACEAE

Commelina benghalensis L. Sp. Pl. 41. 1753; C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. **8**: 41. 1901.

Commelina rufociliata C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. **8**: 54. 1901.

Cholo District: Cholo Mountain, frequent in rain-forest regrowths, ascending herb 50–80 cm. high, flowers blue, 1200 m., Sept. 25, 1946, *17798*. Tropics of the Old World.

Brass 17798 would doubtless come under the var. *hirsuta* C. B. Clarke in DC. Monogr. Phan. **3**: 160 (1881); in Thiselton-Dyer, Fl. Trop. Afr. **8**: 42 (1901); but at present I consider it better to look upon this variety as coming within the normal range of variation of *C. benghalensis*, thus not recognising it as a distinct named entity.

I have examined capsules from both of the type-gatherings of *C. rufociliata*, including a capsule seen by Clarke, and both showed a third dorsal cell developed, thus bringing *C. rufociliata* into sect. *Eu-Commelina*, not in sect. *Disseocarpus* which was where Clarke placed his *C. rufociliata*. I cannot help suspecting that if Clarke did see a capsule without a dorsal cell, then the lack was accidental. *C. rufociliata* is otherwise indistinguishable from *C. benghalensis* var. *hirsuta*.

Commelina neurophylla C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. **8**: 53. 1901.

Zomba District: Zomba Plateau, occasional in *Brachystegia* woodlands, perennial herb, 2 upper petals blue, others greenish and much reduced, 1430 m., May 30, 1946, *16099**. Nyasaland and S. Rhodesia (Norlindh, Bot. Notiser **1948**: 21. 1948).

Aneilema aequinoctiale (Beauv.) Kunth, Enum. **4**: 72. 1843; C. B. Clarke in Thiselton-Dyer, Fl. Trop. Afr. **8**: 65. 1901.

Commelina equinoctialis Beauv. Fl. d'Oware & Benin **1**: 65. *pl.* 38. 1809 (anno falso 1806).

Kota-kota District: Nchisi Mountain, on edges of rain-forest, herb scrambling to a height of 2.5 m., flowers yellow, one fruiting specimen collected, 1500 m., July 28, 1946, *17005*. Cholo District: Cholo Mountain, frequent in rain-forest regrowths, herb about 1 m. high, habit ascending to subscandent, flowers yellow, 1200 m., Sept. 21, 1946, *17723*. Widespread in tropical Africa, southwards to Natal and Pondoland, and, according to Clarke, occurring in Arabia.

Aneilema dispermum Brenan, Kew Bull. **1952**: 198. 1952.

Cholo District: Cholo Mountain, gregarious in rain-forest openings, about 1 m. high, habit ascending, flowers very pale pink, 1200 m., Sept. 23, 1946, *17763*. British Cameroons, Tanganyika Territory, and Nyasaland.

Floscopa rivularis (A. Rich.) C. B. Clarke in DC. Monogr. Phan. **3**: 267. 1881; in Thiselton-Dyer, Fl. Trop. Afr. **8**: 86. 1901.

Aneilema rivularis A. Rich. Tent. Fl. Abyss. **2**: 342. 1850–1851.

Zomba District: Zomba Plateau, plentiful in bogs, herb 30–50 cm. high, plant fleshy, branches ascending, leaves scabrous, flowers purple, 1770 m., May 31, 1946, *16119a.* Kota-kota District: Chia area, muddy edges of waterholes, herb 30–50 cm. high, ascending, fleshy, flowers pink, 480 m., Sept. 3, 1946, *17512.* Widespread in tropical Africa; common on the eastern side, rarer on the western.

PALMAE

Phoenix reclinata Jacq. Fragm. **1**: 27. *pl. 24.* 1801; C. H. Wright in Thiselton-Dyer, Fl. Trop. Afr. **8**: 103. 1901.

Cholo District: Cholo Mountain, frequent on edges of rain-forest, and in second growths, up to about 20 m. high, clumps of several, usually crooked stems, leaves numerous, arched and spreading, 3–3.5 m. long, spadices several, drooping and the peduncles orange-coloured when in fruit, fruits orange-yellow, reddish-brown when thoroughly ripe, peduncles 1–1.2 m. long, photographs, 1200 m., Sept. 2, 1946, *17750.* Widespread in tropical Africa.

Raphia sp.

Kota-kota District: Nchisi Mountain, small clump on wet stream-banks in *Brachystegia* woodland (planted by natives ?), about 6 m. tall, stemless, leaf-segments glaucous beneath, midribs reddish beneath, native name chiwale, 1400 m., Aug. 5, 1946, *17131**.

To name this plant specifically fruits are wanted.

ARACEAE

Sauromatum venosum (Ait.) Kunth, Enum. Pl. **3**: 28. 1841; Schott, Prodr. Syst. Aroid. 71. 1860.

Arum venosum Ait. Hort. Kew. **3**: 315. 1789.
Arum guttatum Wall. Pl. As. Rar. **2**: 10. *pl. 115.* 1831.
Sauromatum guttatum (Wall.) Schott in Schott & Endl. Meletem. 17. 1832; Engl. Pflanzenreich **73**(4^{23F}): 123. 1920.
Sauromatum nubicum Schott, Syn. Aroid. 25. 1856; N.E.Br. in Thiselton-Dyer, Fl. Trop. Afr. **8**: 141. 1901.

Cholo District: Cholo Mountain, one example in rain-forest regrowths, herb 30 cm. high, rhizome irregular, depressed globose, about 8 cm. in diameter, inflorescence very fragrant, spathe reflexed, brownish-green without, yellowish-green blotched with maroon within, margins of limb incurved, sterile apex of spadix brownish-green, 1200 m., Sept. 21, 1946, *17717**. India, Burma, Sumatra, Ubangi-Shari, French Cameroons, Anglo-Egyptian Sudan, Eritrea, Abyssinia, Kenya, Tanganyika Territory, and Nyasaland.

N.E. Brown and Engler distinguished the African from the Asiatic plant as *S. nubicum.* Brown, basing his description chiefly on a single cultivated specimen, distinguished *S. nubicum* from the Asiatic plant, which he called *S. guttatum,* by the rather shorter and much less clavate neuter organs. Engler also used these organs, saying that they were [transl.] "less numerous . . . and more thickened below, sometimes (in a Kilamanjaro specimen) thinly clavate, almost filiform." *S. guttatum* was said to have them "stipitate-claviform." Engler maintained, in addition, that the spathe of *S. nubicum* was narrower than that of *S. guttatum.*

S. venosum is a variable plant, but the several specimens which have by now been collected in tropical Africa convince me that there is no separation to be made between the African and Asiatic plants, either on shape of spathe or of the neuter organs, the supposed differences being trivial and quite inconstant.

ERIOCAULACEAE[57]

Eriocaulon schimperi Koern. ex Ruhl. Bot. Jahrb. **27**: 80. 1899.

North Nyasa District: Nyika Plateau, common in bogs and on marshy banks of grassland streams, herb 20–25 cm. high, just beginning to flower, flower heads grey, 2300 m., Aug. 14, 1946, *17232*. Abyssinia, Uganda, Kenya, Tanganyika Territory, Nyasaland, N. Rhodesia.

CYPERACEAE[58]

Cyperus papyrus L. subsp. **nyassicus** (Chiov.) Kükenth. Pflanzenreich **38** (4^{20}): 47. 1935.

Cyperus nyassicus Chiov. Mem. Ist. Bot. Modena **1**: 72, 76. *pl. 2, f. 1, 2; pl. 4, f. 1, 2.* 1931.

Kota-kota District: Chia area, forming extensive pure stands 2–4 m. high in marshes; leaves reduced to basal scales; sterile; 480 m., Sept. 1, 1946, *17470*. Native name, Gumba (Chinyanja). Endemic.

Cyperus auricomus Sieber ex Spreng. Syst. 1: 230; 1825.

Cyperus digitatus Roxb. subsp. *auricomus* (Sieber) Kükenth. Pflanzenreich **38** (4^{20}): 57. 1935.

Chikwawa District: Lower Mwanza River, common on moist silt; mostly sterile at this season; 180 m., Oct. 4, 1946, *17964*. Tropical Africa. New to Nyasaland.

Cyperus alopecuroides Rottb. Descr. & Icon. 38. *pl. 8, f. 2.* 1773; Kükenth. Pflanzenreich **38** (4^{20}): 71. 1935.

Juncellus alopecuroides C. B. Clarke in Hook. f. Fl. Brit. Ind. 6: 595. 1893.

Chikwawa District: Lower Mwanza River, occasional on wet silt, 180 m., Oct. 4, 1946, *17962*. Old World tropics and subtropics.

Cyperus articulatus L. Sp. Pl. 44. 1753; Kükenth. Pflanzenreich **38** (4^{20}): 77. 1935.

Chikwawa District: Lower Mwanza River, occasional on moist silt, stems cylindrical, 180 m., Oct. 4, 1946, *17963;* frequent on moist silt, 180 m., Oct. 6, 1946, *18002*. Tropics and subtropics and Old and New Worlds.

Cyperus maculatus Böck. in Peters, Reise Mossamb. Bot. 2: 539. 1864; Kükenth. Pflanzenreich **38** (4^{20}): 103. 1935.

Chikwawa District: Lower Mwanza River, common on sandy beaches, 180 m., Oct. 4, 1946, *17968*. Tropical Africa, Madagascar.

Cyperus distans L. f. Suppl. 103. 1781; Kükenth. Pflanzenreich **38** (4^{20}): 137. 1935.

Kota-kota District: Benga, west shore of Lake Nyasa, scattered on sandy beaches, 470 m., Sept. 2, 1946, *17498*. Tropics and subtropics of Old and New Worlds.

Cyperus flabelliformis Rottb. Descr. & Icon. 42. *pl. 12, f. 2.* 1773.

C. alternifolius L. subsp. *flabelliformis* (Rottb.) Kükenth. Pflanzenreich **38** (4^{20}): 193. 1935.

Kasungu District: Kasungu, frequent in semi-shade on dry banks of a stream, rhizome shortly creeping on surface of soil, 1000 m., Aug. 27, 1946, *17441*. Chikwawa District: Lower Mwanza River, common on eroding river banks, 180 m., Oct. 6, 1946, *18012*. Cholo District: Nswadzi River, gregarious on dry banks of river, 840 m., Sept. 27, 1946, *17844*. Native name, Mululu (Chinyanja). Africa, Madagascar.

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[57] Determination by Dr. H. N. Moldenke, The New York Botanical Garden.

[58] By E. Nelmes, Royal Botanic Gardens. Kew.

Cyperus ? derreilma Steud. Flora 25: 585. 1842; Kükenth. Pflanzenreich **38** (4^{20}): 199. 1935.

Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional on sheltered grasslands, in large clumps, 1890 m., July 6, 1946, *16698*. Abyssinia, Belgian Congo. New to Nyasaland. Inflorescence poorly developed.

Cyperus pseudoleptocladus Kükenth. Repert. Spec. Nov. 29: 196. 1931; Pflanzenreich **38** (4^{20}): 201. 1935.

Cyperus leptocladus Oliver, Trans. Linn. Soc. II. Bot. 2: 353. 1884. Not *C. leptocladus* Kunth, 1837.
Cyperus deckenii Böck. sec. C. B. Clarke in Dyer, Fl. Trop. Afr. **8**: 342. 1902.
Cyperus baronii C. B. Clarke in Dyer, Fl. Trop. Afr. **8**: 344, partim. 1902.

Zomba District: Zomba Plateau, frequent in shade of rocks in face of a bluff, leaves glaucous below, 1500 m. June 2, 1946, *16148*. Mlanje District: Mlanje Mountain; Luchenya Plateau, sporadic on forest floor, in dense shade, stems several in small clumps or solitary, 1890 m., July 7, 1946, *16709*. Cholo District: Cholo Mountain, abundant in an open rocky situation in rain forest, gregarious, 1400 m., Sept. 20, 1946, *17664*. Tanganyika Territory.

Cyperus zambesiensis C. B. Clarke in Dyer, Fl. Trop. Afr. **8**: 345. 1901.

Cyperus glaucophyllus Böck. var. *zambesiensis* (C. B. Clarke) Kükenth. Pflanzenreich **38**(4^{20}): 203. 1935.

Kota-kota District: Nchisi Mountain, frequent in openings in rain forest; leaves deeply channelled; stems solitary, erect; 1500 m., July 29, 1946, *17017;* occasional in shrubby forest borders, leaves deeply channelled, etc., 1500 m., July 29, 1946, *17020*. Tanganyika Territory ?

The combination *Cyperus zambesiensis* C. B. Clarke was published, but without description, in Trans. Linn. Soc. II. Bot. **4**: 53 (1894); and in Durand & Schinz, Consp. Fl. Afr. 5: 581 (1894); the former based on *Whyte s.n.* and *Buchanan 647* and the latter (and subsequently) on *Buchanan 47*.

Cyperus leptocladus Kunth, Enum. Pl. **2**: 32. 1837; Kükenth. Pflanzenreich **38** (4^{20}): 205. 1935.

Zomba District: Zomba Plateau, several plants on a moist shady riverbank, stems very soft and weak, pendent, 1500 m., June 7, 1946, *16296*. S. Africa. A weak, shade form.

Cyperus difformis L. Cent. Pl. **2**: 6. 1756; Kükenth. Pflanzenreich **38** (4^{20}): 237. 1935.

Kota-kota District: Benga, west shore of Lake Nyasa, scattered on sandy beaches, 470 m., Sept. 2, 1946, *17492*. Warm temperate, subtropical, and tropical regions of the Old World.

Cyperus sphaerospermus Schrad. Anal. Fl. Capens. 8. 1832.

Cyperus denudatus L. var. *sphaerospermus* (Schrad.) Kükenth. Pflanzenreich **38** (4^{20}): 255. 1935.

Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional in grassy forest areas, 1890 m., July 6, 1946, *16696*. S. Tropical Africa, S. Africa. A weak, shade form.

Cyperus angolensis Böck. Flora **63**: 435. 1880; Kükenth. Pflanzenreich **38** (4^{20}): 1935.

Kota-kota District: Chenga Hill, sporadic in low open *Brachystegia* woodland; leaves rigid, young shoots flowering after grass is burnt; 1600 m., Sept. 9, 1946, *17600*. Tropical Africa.

Pycreus polystachyos (Rottb.) Beauv. Fl. Oware 2: 48. *pl. 86, f. 2.* 1816.

Cyperus polystachyos Rottb. Descr. Pl. 20. 1772; Kükenth. Pflanzenreich **38**(4^{20}): 367. 1935.

Kota-kota District: Benga, west shore of Lake Nyasa, sandy beaches, 470 m., Sept. 2, 1946, *17499.* Chikwawa District: Lower Mwanza River, plentiful on sandy beaches, 180 m., Oct. 3, 1946, *17934.* Tropics and subtropics, Old and New Worlds.

Kyllinga cylindrica Nees var. **major** C. B. Clarke in Dyer, Fl. Trop. Afr. 8: 283. 1902.

Cyperus sesquiflorus (Torr.) Mattf. & Kükenth. var. *major* (C. B. Clarke) Kükenth. Pflanzenreich **38**(4^{20}): 594. 1935.
Kyllingia appendiculata K. Schum. Bot. Jahrb. **24**: 338. *pl. 4, f. A–G.* 1898. Not *C. appendiculatus* Kunth, 1837.
Kyllinga cylindrica var. *appendiculata* (K. Schum.) C. B. Clarke in Dyer, Fl. Trop. Afr. **8**: 283. 1902.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common in open secondary forest; spikelets whitish or very pale green, 1890 m., July 8, 1946, *16728.* Tropical Africa. New to Nyasaland.

Fimbristylis dichotoma (L.) Vahl, Enum. **2**: 287. 1806.

Scirpus dichotomus L. Sp. Pl. ed. 2. 74. 1762.

Mlanje District: Likubula Gorge (lower western slopes of Mlanje Mountain), scattered on rocky bed of river, 840 m., June 20, 1946, *16386.* Chikwawa District: Lower Mwanza River, plentiful on sandy beaches, 180 m., Oct. 3, 1946, *17936.* Old World tropics and subtropics.

Fimbristylis squarrosa (Poir.) Vahl, Enum. 2: 289. 1806.

Scirpus squarrosus Poir. Encyc. Suppl. **5**: 100. 1817. Not *S. squarrosus* L. 1771.

Kota-kota District: Benga, west shore of Lake Nyasa, one flattish tuft on sandy beach, 470 m., Sept. 2, 1946, *17490.* Old and New World tropics and subtropics. New to Nyasaland.

Bulbostylis densa (Wall.) Hand.-Mazz. in Karsten & Schenck, Vegetationsb. 20: 7, 16. 1930.

Scirpus densus Wall. in Roxb. Fl. Ind. ed. Carey **1**: 231. 1820.
Isolepis trifida Nees in Wight, Contr. Bot. Ind. 108. 1834.
Bulbostylis capillaris (L.) C. B. Clarke var. *trifida* (Nees) C. B. Clarke in Hook. f. Fl. Brit. Ind. **6**: 652. 1893.
Bulbostylis trifida (Nees) Nelmes, Kew Bull. **1950**: 209 1950.

Zomba District: Zomba Plateau, confined to shallow wet soil on rocky seepage slopes, 1500 m., June 5, 1946, *16247.* Old World tropics and subtropics.

C. B. Clarke, in Hook. f. Fl. Brit. Ind. 6: 651 (1893), attributed the genus *Bulbostylis* to Kunth (Enum. Pl. 2: 205. 1837), citing the following combinations: *B. barbata* Kunth, Enum. **2**: 208, *B. capillaris* Kunth, Enum. 2: 212, and *B. puberula* Kunth, Enum. **2**: 213. Kunth, however, merely suggested that one of his sections of *Isolepis* could be regarded as a separate genus and mentioned *Bulbostylis* as a suitable name. In fact, he treated this name as a synonym in his index by italicising it, and, after mentioning it (p. 205) in a short description of a section of *Isolepis,* proceeded to describe all the members of the section as species of *Isolepis.* Kunth, therefore, is doubtfully the author of *Bulbostylis,* and certainly not the author of the combinations under this name attributed to him by Clarke. It seems, therefore, unfortunate that "*Bulbostylis* Kunth" has been conserved, against *Bulbostylis* DC. (1836), *Bulbostylis* Stev. (1813), and *Stenophyllus* Raf. (1825).

There is also some doubt as to the identity of *Scirpus capillaris* L. Linnaeus gives the distribution as "Virginia, Aethiopia, Zeylona," but his "type" specimen probably came from Clayton, in America. It certainly agrees with the American "B. capillaris," which has obtuse pubescent glumes, and not with the Indian plant, the glumes of which are acute and glabrous. There is also a striking difference in the achenes of the two plants, that of the American species being transversely wrinkled, while the achene of *B. densa* has a puncticulate surface. The Brass material from Nyasaland is a good match of the Indian plant.

Scirpus rogersii N. E. Brown, Kew Bull. **1921**: 301. 1921.

Kasungu District: Kasungu, common in open muddy bed of a stream, 1000 m., Aug. 28, 1946, *17448*. S. Rhodesia. New to Nyasaland.

Scirpus muricinux C. B. Clarke, Bot. Jahrb. **38**: 135. 1906.

Scirpus paludicola C. B. Clarke in Dyer, Fl. Cap. **7**: 231, partim. 1898.

Kota-kota District: Chia area, muddy edges of waterholes on dry lake plain, shoots prostrate, 480 m., Sept. 5, 1946, *17541*. Rhodesia, Orange Free State. New to Nyasaland.

Scirpus fluitans L. Sp. Pl. ed. 2. 71. 1762.

Isolepis fluitans (L.) R. Br. Prodr. 221. 1810.
Eleocharis fluitans (L.) Hook. Brit. Fl. 24. 1830.

Mlanje District: Mlanje Mountain (southwest ridge), submersed in rocky parts of a stream, in dense masses, 2120 m., June 28, 1946, *16516*. Old World; mountains only in tropics, widespread in cooler parts.

Fuirena nyasensis Nelmes, sp. nov.

Affinis *F. chlorocarpae* Ridl., sed inflorescentia explicatiore, spiculis majoribus, squamis pallidioribus majoribus praecipue differt.

Herba dense caespitosa. *Culmi* 80–90 cm. alti, erecti, prominenter sed obtuse trigoni, basin versus claro-purpurei et angulis parce pubescentes, superne glabri et virides, rigiduli, subgraciles (inferne circiter 2 mm. crassi, sursum graciliores), nodosi, e nodis vaginis plerumque 2–3 cm. longis ortis, vaginae basales vix laminatae, sursum longius laminatae; laminae planiusculae vel leviter involutae, 3–5 mm. latae, apicem versus longe acuminatae, obliquae vel valde reflexae, marginibus partim et nervo mediano subtus parce pubescentes; vaginae basilares parce pubescentes, superiores ore pubescente excepto glabrae; internodia inferiora 6–9 cm. long, superiora usque 17 cm. longa. *Bracteae* 2, reflexae, inferiore 2.5–3.5 cm. longa breviter vaginante, superiore minore vix vaginante; laminae et vaginae albo-hirtellae. *Inflorescentia* capita duo spicarum formans, spicis contiguis vel approximatis, 3.5–5 cm. longa, utroque capite e spicis circiter 5–20 fasciculatis composita, ambitu pyramidata vel subglobosa. *Spicae* digitatae, explicatae, densiflorae, brunneae, ovoideo-lanceolatae, 5–9 mm. longae, 3.5–4 mm. crassae (aristis exclusis). *Squamae* oblongo-ovatae, 2.5–2.75 mm. longae (aristis exclusis), 1.75–2 mm. latae, cymbiformes, apice rotundatae, tenuiter membranaceae, translucentes, inferne glabrescentes vel minute adpresse pubescentes, superne parce vel subdense pubescentes, marginibus parce vel subdense ciliolatae, pallidae se apicem versus interdum fuscae, castaneo-maculatae, latere enerves vel tenuissime nervosae, nervo mediano cum 2 lateralibus apicem versus confluente in aristam parce setulosam strictam vel leviter curvatam vel flexuosam 1–1.5 mm. longam excurrente. *Stamina* 3. *Setae hypogynae* 6, nuci aequilongae, minute retrorse scabridae, filiformes. *Nux* late ellipsoideo-obovoidea, trigona, angulis incrassata, circiter 1.5 mm. longa (stipite rostroque inclusis), circiter 0.8 mm. lata, brunneo-viridis, demum fuscescens, inferne attenuata, tum in stipitem validum 0.3–0.4 mm. longum abrupte contracta, et superne in rostrum conicum 0.25 mm. longum abrupte contracta. *Stylus* basi incrassatus in apice nucis persistens.

NYASALAND: Kota-kota District: Nchisi Mountain, marshy ground in *Brachystegia* woodland, 1400 m., July 27, 1946, *16980.*

Fuirena chlorocarpa Ridl. Trans. Linn. Soc. II. Bot. 2: 159. 1884.

Zomba District; Zomba Plateau, several tufts in a rock crevice on side of a waterfall, 1500 m., June 6, 1946, *16277.* Tropical and S. Africa, Madagascar. New to Nyasaland.

Fuirena ciliaris (L.) Roxb. Fl. Ind. 1: 184. 1820.

Scirpus ciliaris L. Mant. 182. 1771.
Fuirena glomerata Lam. Tab. Encyc. 1: 150. 1791.

Chikwawa District: Lower Mwanza River, occasional on moist silt, plant bluish green, forming flattish clumps, 180 m., Oct. 4, 1946, *17970.* Old World tropics. New to Nyasaland.

Ascolepis capensis (Kunth) Ridl. Trans. Linn. Soc. II. Bot. 2: 164. 1884.

Platylepis capensis Kunth, Enum. Pl. 2: 269. 1837.

Zomba District: Zomba Plateau, scattered over a quaking bog, 1770 m., May 31, 1946, *16111.* Tropical and S. Africa.

Costularia natalensis C. B. Clarke in Dyer, Fl. Cap. 7: 274. 1898.

Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent on flood banks of a grassland stream, forming large clumps, 1820 m., July 5, 1946, *16673;* common locally on grassy ridges, 1890 m., July 8, 1946, *16740.* Transvaal, Natal. Genus hitherto known only from S. Africa and Madagascar.

The combination *Costularia natalensis* C. B. Clarke was first published, but without description, in Durand & Schinz, Consp. Fl. Afr. 5: 658 (1894).

Scleria racemosa Poir. in Lam. Encyc. 7: 6. 1806.

Ophryoscleria racemosa Nees in Mart. Fl. Bras. 2: 183. 1842.

Kota-kota District: Chia area, moist banks of waterholes, gregarious in large clumps, 480 m., Sept. 5, 1946, *17533.* Tropical Africa, Madagascar.

Scleria pulchella Ridl. Trans. Linn. Soc. II. Bot. 2: 168. 1884.

Zomba District: Zomba Plateau, gregarious on a sunny seepage slope; plant strikingly citronella scented; 1750 m., May 31, 1946, *16108.* Angola.

Coleochloa virgata (K. Schum.) Nelmes, Kew Bull. 1953: 381. 1953.

Eriospora virgata K. Schum. in Engl. Pflanzenw. Öst.-Afr. C: 128. 1895.

Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent on shallow rocky soil on grasslands, bright green clumps about 1 m. high, immature, 2100 m., July 3, 1946, *16653;* forming massive tussocks on open grasslands, peaty fibrous base of tussocks crowded into vase-shaped ferns, 1890 m., July 8, 1946, *16737.* Tanganyika Territory. New to Nyasaland.

These gatherings agree with Schuman's description so far as it goes, but because of its inadequacy and in the absence of the type, presumably destroyed in the war, one cannot be quite sure about the determination.

Coleochloa oliveri (Böck.) Gilly, Brittonia 5: 14. 1943.

Trilepis oliveri Böck. Cyp. Nov. 1: 38. 1888.
Eriospora oliveri (Böck.) C. B. Clarke in Dyer, Fl. Trop. Afr. 8: 513. 1902.

Mlanje District: Mlanje Mountain; Luchenya Plateau, on open rock slopes, plant greyish, clumped, 1860 m., June 26, 1946, *16438;* abundant on shallow rocky soil on grasslands, bright green clumps about 1 m. high, immature, 2100 m., July 3, Rhodesia, Tanganyika Territory, Mozambique.

Eriospora Hochst. ex A. Rich. (1851) is a later homonym of *Eriospora* Berk. & Br. (1850), which is in use for a genus of fungi, and *Trilepis* is a distinct and mainly American genus. Hutchinson, having to deal with *E. pilosa* for the Fl. W. Trop. Africa (2: 490. 1936), transferred it to *Catagyna* Beauv. Gilly, however, argues (Brittonia 5: 13. 1943) that "the exact application of this generic name can be determined only if the Dupetit-Thouars specimen [on which *Catagyna* was founded] can be found; on the basis of the spikelet and achene characters, the name would seem to be based on some species of *Scleria,*" and he proposes the new genus *Coleochloa* to accommodate all the African species of *Eriospora* with the exception of *E. pilosa* itself, which he transfers to *Trilepis.* Until *Catagyna* is known with more certainty, it seems better to use Gilly's combinations under *Coleochloa* than to make new and what may prove to be superfluous ones under *Catagyna.*

Coleochloa sp.

Zomba District: Zomba Plateau, plentiful in small clumps on an exposed rocky summit; very pubescent; 1820 m., May 31, 1946, *16133.* Apparently a new species but too immature to describe.

Carex zuluensis C. B. Clarke, Kew Bull. Add. Ser. **8**: 74. 1908.

Carex huttoniana Kükenth. Pflanzenreich **38**(4^{20}): 271. 1909.

Loc.? One example on open grassland, 2100 m., July 18, 1946, *16869.* Zululand, Tembuland, Orange Free State, Natal.

Carex nyasensis C. B. Clarke in Dyer, Fl. Trop. Afr. **8**: 519. 1902.

Kota-kota District: Nchisi Mountain, gregarious in shelter of rocks in *Brachystegia* woodland, 1400 m., July 26, 1946, *16948.* Rhodesia.

Carex brassii Nelmes, sp. nov.

Affinis *C. spicato-paniculatae* C. B. Clarke, sed foliis angustioribus, spicis longioribus, utriculis longioribus praecipue differt.

Herba laxe caespitosa. *Culmi* 80–120 cm. alti (inflorescentia inclusa), graciles (inferne 1.5–2 mm. crassi, superne 1–1.5 mm. crassi), obtuse trigoni, costati, rhachibus inclusis laeves, erecti, dimidio infero solo foliati, basi vaginis aphyllis subintegris vel subdissolutis rubro-purpureis circumdati. *Folia* 3–4 mm. lata, culmis multo breviora, subplana vel marginibus leviter revoluta, sicca subrigida et cinereo-viridia, partim tenuiter septato-nodulosa; vaginae foliorum inferiorum saturate purpureo-rubrae. *Inflorescentia* anguste composito-paniculata, interrupta, 30 cm. longa; *paniculae secundariae* 7, infima singula excepta inaequaliter binae, plus minus oblongo-lanceolatae, laxae, 5–7.5 cm. longae, 2.5–3 cm. latae, inferiores usque 4–5 cm. distantes, breviter vel sublonge exserte pedunculatae, superiores approximatae vix vel brevissime exserte pedunculatae, ramulis inferioribus saepe 2–3(4)-stachyis, ramulis et spicis demum patulis vel subpatentibus; pedunculi compresse trigoni, graciles, apicem versus angulis acutis interdum parce scaberuli, inferne angulis obtusi et laeves; *rhachi* panicularum secundariarum angulis acuta vel alata, scaberula. *Bracteae* foliaceae sed superiores multo minores, culmo apicem attingentes, inferiores sublonge vaginantes, superiores breviter vel brevissime vaginantes; vaginae brunneae, ore leviter membranaceae, concavae, nodis pallidis exceptis virides, laeves. *Spicae* androgynaceae, 8–17 mm. longae, sublaxiflorae, sessiles, longiorum parte mascula quam pars feminea longiore, ceterarum parte mascula parti femineae subaequilonga. *Bracteolae* 1.5–2 mm. longae, squamiformes sed squamis minores, minute hispidulae, breviter vel longe

aristatae; arista saepe curvata, hispidulo marginata. *Cladoprophyllum* circiter 3 mm. longum infeme utriculiforme et laeve, superne squamiforme et minute hispidulum. *Squamae femineae* 4-5 mm. longae (squama propria 3.5–4 mm. longa; arista 0–1.5 mm. longa), 1.75–2 mm. latae, ovato-lanceolatae, cymbiformes, apice acutae vel obtusae, superne marginibus interdum involutae, distincte tenuiter multinerves, pallidae sed castaneo-maculatae vel claro- vel fusco-castaneae, saepe marginibus apice albido-hyalinae et erosae, superiores glabrae, inferiores saepe minute subadpresso-setulosae, nervo mediano interdum in aristam marginibus hispidulam excurrente; *squamae masculae* longiores, glabrae, saepe rubrae. *Utriculi* 5.25–5.5 mm. longi (rostro incluso), circiter 1 mm. lati, distincte trigoni, faciebus planiusculi, subcoriacei, ellipsoidei, haud vel leviter marginati, pallide virides, ventre 2–4-nerves, dorso 4–8 nerves (nervis margines versus), glabri et laeves vel interdum apice (infra rostrum) parcissime hispiduli, basin versus sensim attenuati, basi spongiosa-subbulbosi, in rostrum inferne pallide viride superne rubidum angustissime marginatum marginibus laeve vel parcissime hispidulum bidentatum circiter 2.5 mm. longum subsensim desinentes; dentes substricti, saepe rubidi, 0.5–0.75 mm. longi. *Nux* circiter 3 mm. longa, circiter 1 mm. lata, obtuse trigona faciebus planiuscula, anguste ellipsoidea vel oblongo-ellipsoidea, minute dense alveolata, brunnea, breviter pallide rostrata et stipitata. *Stylus* basi haud incrassatus. *Stigmata* 3.

NYASALAND: Mlanje District: Mlanje Mountain; Luchenya Plateau, scattered on banks of a stream in dense forest shade, 1890 m., July 7, 1946, *16714.*

RESTIONACEAE[59]

Hypolaena mahonii N. E. Brown in Dyer, Fl. Trop. Afr. **8**: 265. 1901.

Mlanje District: Mlanje Mountain, southwest ridge, common in moist grassy situations on summit, 2400 m., June 28, 1946, *16498.* Luchenya Plateau, occasional on grassy floodbanks of a stream, stems erect, gregarious in masses, 1800 m., July 5, 1946, *16666.* Endemic.

This female plant of *Hypolaena* appears to belong to *H. mahonii* N. E. Brown, of which only male specimens have hitherto been known. The species was described from Zomba; this material (of two gatherings) comes from Mt. Mlanje. *H. mahonii* is the only species of this S. African genus to get into Tropical Africa.

GRAMINEAE[60]

BAMBUSEAE

Arundinaria alpina K. Schum. in Engl. Pflanzenw. Ost-Afr. **C**: 116. 1895.

Mlanje District: Mlanje Mountain; Luchenya Plateau, plentiful in bottoms of forested ravines, 1820 m.; culms up to 10 m. high, in open clumps, green, hollow, 3.5–5 cm. in diameter, July 5, 1946, *16676.* A gregarious bamboo of the mountain forests of the Anglo-Egyptian Sudan (Imatong Mountains), Abyssinia, Kenya Colony, Uganda, Belgian Congo, Tanganyika Territory, and Nyasaland, occurring at elevations of 1800–3260 m.

In an article on this "African alpine bamboo," S. H. Wimbush (Emp. For. Jour. 24^1. 1945; E. Afr. Agr. Jour. **13**: 56–60. 1947), estimates that its life cycle on the Aberdare Range, Kenya Colony, is more than forty years.

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[59] By E. Nelmes, Royal Botanic Gardens, Kew.

[60] By C. E. Hubbard, Royal Botanic Gardens, Kew.

ARUNDINEAE

Phragmites mauritianus Kunth, Rév. Gram. 1: 277. *pl. 50.* 1830; C. E. Hubbard in Hill, Fl. Trop. Afr. **10:** 155. 1937.

Phragmites laxiflorus Steud. Syn. Pl. Glum. **1:** 196. 1854.
Phragmites communis Trin. subsp. *mossambicensis* Anderss. in Peters, Reise Mossamb. Bot. 555. 1863.
Phragmites communis Trin. var. *mauritianus* (Kunth) Baker, Fl. Maurit. 454. 1877.
Phragmites vulgaris Crép. var. *mauritianus* (Kunth) Durand & Schinz, Consp. Fl. Afr. 5: 876. 1895.
Phragmites vulgaris Crép. var. *mossambicensis* (Kunth) Durand & Schinz, Consp. Fl. Afr. 5: 876. 1895.
Phragmites pungens Hack. Bull. Herb. Boiss. II. **1:** 771. 1901.

Kota-kota District: Nchisi, forming tall brakes in marshy bottoms of gullies, 1350 m., August 1, 1946, *17082.* Frequent in tropical Africa from Sierra Leone eastwards to Eritrea and south to Angola, Bechuanaland, and Southern Rhodesia; extending to Egypt, Transvaal, Natal, and the Mascarene Islands.

FESTUCEAE

Bromus cognatus Steud. Syn. Pl. Glum. **1:** 321. 1854.

Zomba District: Zomba Plateau, frequent on moist edges of riparian rain-forest, 1680 m., May 31, 1946, *16105.* Mountains of tropical east Africa from northeast Africa south to Nyasaland.

Pseudobromus brassii C. E. Hubbard, Kew Bull. 1949: 341. 1949.

Species a *P. biflora* A. Camus, culmis altioribus nodos versus retrorse scaberulis, foliorum vaginis apicem versus retrorse scaberulis vel minute hispidulis, laminis longioribus et latioribus, pedicellis spiculis glumis et lemmatibus brevioribus, arista subterminali differt.

Gramen perenne, laxe caespitosum, 150–180 cm. altum; innovationes extravaginales. *Culmi* erecti, 2-3-fasciculati, validiusculi, teretes, usque 4 mm. diametro, simplices, circiter 10-nodes, nodos atro-brunneos versus minute et retrorse scaberuli, ceterum glabri, laeves, internodio supremo laevi e vagina longe exserto. *Folia* atro-viridia; vaginae teretes, striatae, apicem versus retrorse scaberulae vel minute hispidulae, ceterum glabrae et laeves, margines liberae, apice exauriculatae, basales et intermediae internodiis longiores, superiores internodiis breviores; ligulae obtusissimae vel truncatae, firme membranaceae vel chartaceae, usque 5 mm. longae; laminae lineares, basin versus attenuatae vel basi contractae, apice longe attenuatae, tenuissime acutae, usque 45 cm. longae et 1.6 cm. latae, planae, firmae, tenuiter et arcte multinerves, inter nervos transverse nervatae, nervis prope margines et apicem versus minute scaberulae, marginibus scabridae, ceterum glabrae, laeves. *Panicula* laxissima, nutans, plus minusve oblonga, 35 cm. longa, 15 cm. lata; rhachis laevis; rami erecti vel demum patentes, bini, elongati, inferiores usque 25 cm. longi, gracillimi, glabri, laxissime et distante divisi; ramuli scabridi; pedicelli fere capillares, inaequales, 4–18 mm. longi, scabridi. *Spiculae* 8–9 mm. longae, 2-florae, oblongae, demum obcuneatae, virides vel purpureo-tinctae; rhachilla dorso dense scabrida, filiformis, internodiis 2 mm. longis. *Glumae* paullo inaequales, marginibus latis hyalinis exceptis herbaceo-membranaceae, 1-3-nerves, nervibus lateralibus brevibus; inferior lanceolata, acuminata, tenuiter acuta, 4.5–5 mm. longa; superior late lanceolata vel ovata, acuta, nonnunquam mucronata, 5.5–6.5 mm. longa. *Anthoecia* 3, duo ⚥, supremum sterile. *Lemmata* a latere visa lineari-lanceolata, explanata oblongo-ovata vel elliptico-ovata, acuta, 7–8 mm. longa, marginibus angustis et apice hyalinis exceptis firme herbacea, 3- sub 5-nervia, nervis intermediis valde obscuris, minutissime et dense asperula, aristata; arista 10–14 mm. longa, subterminalis, stricta vel flexuosa, minute scaberula. *Paleae* anguste oblongae, acutae, lemmatibus paullo breviores vel aequilongae, carinis minute scaberulae. *Lodiculae* oblongae, inaequaliter lobatae, 1.5 mm. longae. *Antherae* 4 mm. longae. *Ovarium* apice minute et sparse pubescens.

North Nyasa District: Nyika Plateau, common in small openings in montane forest, 2350 m., August 7, 1946, *17282.*

The genus *Pseudobromus* K. Schum., as at present understood, comprises six to eight species of forest grasses occurring in East Africa (Didinga and Imatong Mountains, Anglo-Egyptian Sudan southwards to the Transvaal) and Madagascar. As originally described it was characterised by lanceolate 1-flowered spikelets and 3-nerved lemmas. In the new species and in *P. biflorus* A. Camus, however—the latter known from the description alone—the spikelets possess two fertile and a sterile third floret, whilst the lemmas are 3–5-nerved, the inner pair of nerves in 5-nerved lemmas being very obscure and imperfectly developed. In these respects the two species closely approach the genus *Festuca* L., in which the spikelets bear two or more fertile florets and the lemmas are 5–7-nerved. Judging from the description of *P. biflorus,* this species differs from *P. brassii* by its shorter (0.75 m.) smooth culms, smooth leaf-sheaths, shorter (20–28 cm.) and narrower (5–7 mm.) leaf-blades, shorter (1.5–2 mm.) ligules, longer (0.5–5 cm.) pedicels, and by its longer glumes (I. 5.5 mm., II. 7–7.5 mm.) and lemmas (9–10 mm.).

Pseudobromus sylvaticus K. Schum. in Engl. Pflanzenw. Ost-Afr. C: 108. 1895.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common on open banks of stream in forest, 1820 m., July 1, 1946, *16569.* Also on mountains in southern Anglo-Egyptian Sudan, Uganda, and Tanganyika Territory.

DANTHONIEAE

Pentaschistis natalensis Stapf in Dyer, Fl. Cap. 7: 493. 1899; C. E. Hubbard in Hill, Fl. Trop. Afr. 10: 126. 1937.

Mlanje District: Mlanje Mountain; Luchenya Plateau, tufted on rocks in grassland, 2100 m., July 3, 1946, *16648.* Also in Tanganyika Territory (Mt. Rungwe), Southern Rhodesia (Mt. Inyanga), and Natal.

ARUNDINELLEAE

Loudetia simplex (Nees) C. E. Hubbard in Kew Bull. 1934: 431. 1934; in Hill, Fl. Trop. Afr. 10: 25. 1937.

Tristachya simplex Nees, Fl. Afr. Austr. 269. 1841.

Trichopteryx simplex (Nees) Hack. ex Engl. Abh. Preuss. Akad. Wiss. 1891, 2: 129. 1892 (Engl. Hochgebirgsfl. Trop. Afr.).

Zomba District: Zomba Plateau, common in Brachystegia woodlands, 1430 m., May 30, 1946, *16094.* Mlanje District: Mlanje Mountain; Luchenya Plateau, dominant grass on bauxitic soils, 1890 m., July 15, 1946, *16841.* Widespread in tropical Africa from French Guinea eastwards to Abyssinia and south to Angola and Southern Rhodesia; also in South Africa (Transvaal, Natal, and Orange Free State) and Madagascar.

The two gatherings represent distinct variants of this extremely polymorphic species, *16094* possessing glabrous or nearly glabrous glumes, whilst those of *16841* bear white bristle-like hairs from dark brown tubercles.

Trichopteryx stolziana Henrard, Repert. Sp. Nov. 18: 242. 1922; C. E. Hubbard in Hill, Fl. Trop. Afr. 10: 10. 1937.

Zomba District: Zomba Plateau, massed in shelter of rocks on an exposed bluff, 1500 m., June 2, 1946, *16153.* Also in southern Tanganyika Territory.

PAPPOPHOREAE

Schmidtia bulbosa Stapf in Dyer, Fl. Cap. 7: 658. 1900.

> *Antoschmidtia bulbosa* (Stapf) Peter, Repert. Sp. Nov. Beih. 40[1]: 307. 1931; Bremekamp & Obermeyer, Ann. Transv. Mus. 16: 405. 1935.

Chikwawa District: Chikwawa, frequent in *Acacia* woodlands, 200 m., October 3, 1946, *17909*. Tanganyika Territory, southwards to South Africa.

The name *Schmidtia* Steud. (1852) is illegitimate, being a later homonym of *Schmidtia* Moench (1802) and *Schmidtia* Tratt. (1816), for which reason the name *Antoschmidtia* Steud. ex Boiss. (1884) has been used in its place on a few occasions in recent years. Because of its very extensive use in floras, etc., *Schmidtia* Steud. was recommended for conservation by M. L. Green (Kew Bull. 1935: 479), this proposal being accepted by the special committee appointed by the 6th International Botanical Congress, Amsterdam, 1935 (see Sprague, Kew Bull. 1940: 90).

ERAGROSTEAE

Bewsia biflora (Hack.) Goossens, S. Afr. Jour. Sci. 37: 184. 1941.

> *Diplachne biflora* Hack. Bull. Herb. Boiss. 3: 387. 1895; Stapf in Dyer, Fl. Cap. 7: 593. 1900.

Kota-kota District: Nchisi Mountain, occasional in *Brachystegia* woodland, 1400 m., August 4, 1946, *17127*. Tanganyika Territory, southwards to Natal and Orange Free State.

Eragrostis arenicola C. E. Hubbard, Kew Bull. 1949: 345. 1949.

Species affinis *E. ciliari* (L.) R.Br., sed inflorescentiis elobatis erectis rigidioribus plerumque latioribus et laxioribus, spiculis et lemmatibus paullo majoribus, lemmatis carinis eciliatis, fructu plerumque majore anguste ovoideo vel ovoideo-oblongo differt.

Gramen annuum, 15–45 cm. altum. *Culmi* laxe vel dense fasciculati, vel solitarii, erecti vel geniculato-ascendentes, graciles vel gracillimi, teretes, 1–5-nodes, e nodis inferioribus ramosi, vel simplices, glabri, laeves, infra nodos glandium epidermalium parvularum annulo praediti, internodio supremo plerumque longissimo e vagina superiore longe exserto. *Foliorum vaginae* internodiis demum breviores, striatae, saepe purpurascentes, pilis e tuberculis minutis ortis sparse pilosae vel marginibus apicem versus saepe ciliatis exceptis glabrae, ore laxe et transverse barbatae; ligulae ad seriem ciliorum brevissimorum redactae; laminae lineares, in acumen setaceum longe attenuatae, 3–15 cm. longae, 2–6 mm. latae, planae vel siccitate superne involutae, virides vel glaucae, minute et obscure scaberulae, ore pilis longiusculis laxe barbatae, ceterum glabrae. *Panicula* lineari-oblonga vel anguste oblonga vel lanceolata, contracta et densa, vel laxiuscula, 4–22 cm. longa, 0.5–2.5 cm. lata, erecta, purpurea, vel purpureo- et pallide viridi-variegata, vel viridis; rhachis et rami minute scaberuli, glabri vel nodis sparse pilosi; rami gracillimi, angulati, erecti vel leviter patentes, plerumque solitarii, dense vel laxiuscule spiculati, usque 4 cm. longi; pedicelli inaequales, 0.6–2 mm. longi, scaberuli. *Spiculae* oblongae vel late ovato-oblongae, 2.5–4 mm. longae, 1.5–2.5 mm. latae, 6–12-florae; rhachilla supra glumas et inter anthoecia articulata, internodiis glabris 0.2–0.3 mm. longis. *Glumae* paullo inaequales, explanata lanceolato-oblongae vel oblongae vel ovatae, acutae, carinatae, 1-nerves, tenuiter membranaceae, carina scaberulae; inferior 1–1.6 mm. longa; superior 1.3–2 mm. longa. *Lemmata* imbricata vel demum contigua, explanata late oblonga vel oblongo-elliptica, apice rotundato-truncata, 1.3–1.5 mm. longa, membranacea, prominenter 3-nervia, nervis minute scaberula, glabra. *Paleae* lemmatibus paullo breviores, oblongae, truncatae vel truncato-emarginatae, carinis ciliis patentibus usque 0.7 mm.

longis e tuberculis minutis ortis dense et rigide ciliatae. *Antherae* 2–3, oblongae, 0.3–0.6 mm. longae, purpureae. *Fructus* anguste ovoideus vel ovoideo-oblongus, 0.6–0.7 mm. longus, castaneus, laevis.

NORTHERN NIGERIA: Zaria District, *Taylor 22.*

ANGLO-EGYPTIAN SUDAN: Imatong Mountains; Katire, on path, 1080 m., Dec. 17, 1935, *Thomas 1607.*

TANGANYIKA TERRITORY: Iringa Province; Mbeya District, Mbozi Region, *Jacobsen 37.* Kyimbila District, Massako, Nov. 4, 1912, *Stolz 1648a.*

NYASALAND: North Nyasa District; Fort Hill, Tanganyika Plateau, 1050–1200 m., July 1896, Whyte. Between Mpata and commencement of Tanganyika Plateau, 600–900 m., July 1896, *Whyte.* West Nyasa District: Luwagi, old garden sites on good red loam, 450 m., April 4, 1938, *Fenner 330.* Mombera District; Mzimba Ekwendeni area, 1937, *Wilson 24, 26.* Kota-kota District; Chia area, sandy beaches of streams, 480 m., Sept. 4, 1946, *Brass 17521.* South Nyasa District; Katema (Chimsak), due west of Fort Johnston, native gardens, footpaths, on light soils, 900 m., April 20, 1937, *Lawrence 386.* Neighbourhood of Zomba, c. 900 m., 1936, *Cormack 53, 84, 138, 197, 231, 272, 304.*

PORTUGUESE EAST AFRICA: Nyassa District; Massangulo, abundant on dry argillaceous soils, 330 m., April 1935, *Gomes e Sousa 1414.*

NORTHERN RHODESIA: Broken Hill, May 28, 1914, *Rogers 7686.* Broken Hill School grounds, March 1936, Govt. School 35. Near Mumbwa, 1911, *Macaulay 21.* Mazabuka, ruderal in sandy places, 1080 m., April 8, 1932, *Trapnell 1072*; ibid., May 1932, *Trapnell 2029b.* Kafue District, Chikupi, c. 900 m., August 18, 1929, *Sandwith 16.* Pemba, in swamps, 1200 m., May 1932, *Trapnell 2029a.* Choma, May 1909, *Rogers 8004.* Kalomo, May 1914, *Rogers 7709.*

SOUTHERN RHODESIA: Marandellas, edge of vlei and in sand veld, 1620 m., April 10, 1930, *Rattray 88.* Salisbury, 1440 m., April 1920, *Eyles 2190* (TYPE), *2508.* Hartley District; Makwiro, 1290 m., April 1920, *Mainwaring* (in Herb. Eyles) *2209.* Poole Farm, Hartley, ruderal, 1200 m., April 17, 1944, *Hornby H. 2359* (S. Rhod. Govt. Herb, 12510). Mashonaland, May 1931, *Fitt 170.* Trelawney, Tobacco Station, 1350 m., June 16, 1943, *Jack 214* (S. Rhod. Govt. Herb. 10247). Zimbawe, August 15, 1929, *Hitchcock 27320.*

This annual weed is of fairly frequent occurrence in south-east tropical Africa, where it has occasionally been confused with its close relative *E. ciliaris* (L.) R.Br. From this species, typical plants may be distinguished by the stiffer more erect and relatively looser inflorescences, and by the slightly larger glumes, lemmas, and seeds. When the panicles are congested and rather dense, however, the most reliable distinguishing character is to be found in the absence of cilia on the lower half of the keels of the lemma. In *E. ciliaris,* these cilia are at first somewhat obscure, being tightly adpressed to the middle nerve, but at maturity they spread so as to push the lemmas apart, in this way creating the rather woolly dense lobed inflorescence which is such a characteristic feature of this widespread tropical species.

Eragrostis buchananii K. Schum. in Engl. Pflanzenw. Ost-Afr. C: 114. 1895.

Eragrostis acutissima Jedw. in Mez, Bot. Arch. 5: 186. 1924.

Zomba District: Zomba Plateau, one clump on a seepage area on an exposed rocky summit, 1820 m., May 31, 1946, *16142*; ibid., frequent small clumps on sheltered ledges on a bluff, 40–50 cm. high, 1500 m., June 2, 1946, *16155.* Also on Mt. Mlanje, Nyasaland.

Eragrostis canescens C. E. Hubbard, Kew Bull. 1949: 348. 1949.

Species affinis *E. hispidae* K. Schum. sed laminis longioribus, paniculis majoribus, ramis rigidioribus plus minusve strictis, spiculis laxe dispositis, glumis brevioribus, lemmatibus latioribus supra medium nervibus evanescentibus, palearum carinis scaberulis differt.

Gramen perenne, densissime caespitosum, usque 50 cm. altum; innovationes intravaginales. *Culmi* erecti, gracillimi, teretes, simplices, basin versus vaginatae, enodes, pilis albis longiusculis appressis vel leviter patentibus pilosi, vel glabrescentes vel glabrae. *Foliorum vaginae* arcte appressae, angustae, tenuiter

striatae, imbricatae, firmae, marginibus membranaceae, laxe pilosae vel glabrescentes vel glabrae, basales persistentes, in fibras demum fissae; ligulae ad seriem ciliorum minutorum redactae; laminae filiformes, breviter acutae vel obtusae, usque 30 cm. longae, arcte conduplicato-convolutae, teretes, 0.3–0.6 mm. diametro, rigidae, erectae et strictae vel plus minusve curvatae, glauco-virides, laeves, vaginam versus pilosae, ceterum sparse pilosae vel glabrae. *Panicula* erecta, lanceolata vel lanceolato-elliptica, demum laxiuscula, 12–30 cm. longa, usque 6 cm. lata, canescens; rhachis sulcata, pilosa vel glabra, rigida, seta tenuissima terminata; rami solitarii, erecti vel oblique patentes, angulares, stricti vel leviter flexuosi, laxe divisi, scaberuli, usque 8 cm. longi, basin versus pilosi vel omnino glabri, seta tenuissima scaberula usque 10 mm. longa terminati; pedicelli capillares, flexuosi vel curvati, laeves, usque 6 mm. longi, apice incrassati. *Spiculae* ovatae, late ovatae, oblongo-ovatae, vel late oblongae, a latere compressae, 5–9 mm. longae, 2.5–4 mm. latae, 5–20-florae, dense pilosae, olivaceo-cinereae; rhachilla persistens, flexuosa, glabra, laevis, internodiis 0.5 mm. longis. *Glumae* tenuiter membranaceae, 1-nerves, pilis albis longiusculis plus minusve appressis vel patulis densiuscule pilosae; inferior explanata ovata, obtusa, 2–2.5 mm. longa; superior explanata late ovata, obtusa, 2–3 mm. longa. *Lemmata* imbricata, demum oblique patentia, a latere visa elliptica vel semi-ovato-elliptica, explanata late elliptica, breviter acuta vel obtusa, 2–3 mm. longa, tenuiter membranacea, ut glumis pilosa, 3-nervia, nervis supra medium evanescentibus. *Paleae* late obovatae, emarginatae vel obtusae, 2–2.3 mm. longae, membranaceae, inter carinas concavae, carinis minute scaberulae. *Lodiculae* obcuneatae, truncatae. *Antherae* 3, 1 mm. longae.

North Nyasa District: Nyika Plateau, locally common on grasslands of plateau rim, a grass of the slopes not seen on open plateau, 2340 m., August 19, 1946, *Brass 17334* (TYPE). Between Kondowe and Karonga, 600–1800 m., July 1896, *Whyte.* Nymkowa Mountain, growing plentifully near woods, 1950 m., Sept. 1902, *McClounie 28.* North Nyasaland: without precise locality, *Whyte.*

A member of a small group, including *E. longepaniculata* De Wild. and *E. hispida* K. Schum., in which many, if not all, of the primary ramifications of the inflorescence terminate in a fine naked bristle devoid of spikelets.

Eragrostis chapelieri (Kunth) Nees, Fl. Afr. Austr. 392. 1841.

Poa chapelieri Kunth, Rév. Gram. 2: 543. *pl. 186.* 1832.

Kasungu District: Kasungu, frequent in *Brachystegia* woodland, 1000 m., August 25, 1946, *17417.* Kenya Colony and Uganda, southwards to South Africa; also in the Mascarene Islands.

Eragrostis ciliaris (L.) R. Br. in Tuckey, Narr. Exp. R. Zaire App. 478. 1818.

Poa ciliaris L. Syst. Nat. ed. 10. 2: 875. 1759.
Poa boryana Willd. Enum. Pl. Hort. Berol. 109. 1809.
Megastachya ciliaris (L.) Beauv. Agrost. 74, 167, 174. 1812.
Megastachya boryana (Willd.) R. & S. Syst. Veg. 2: 592. 1817.
Eragrostis villosa Trin. Fund. Agrost. 137. 1820.
Cynodon ciliaris (L.) Rasp. Ann. Sci. Nat. 5: 302. 1825.
Eragrostis lobata Trin. Mém. Acad. St. Pétersb. VI. 1: 396. 1830.
Eragrostis boryana (Willd.) Steud. Nom. Bot. ed. 2. 1: 562. 1840.
Eragrostis pulchella Parl. in Hook. Niger Fl. 188. 1849.
Eragrostis lepida Hochst. ex A. Rich. Tent. Fl. Abyss. 2: 424. 1851.
Eragrostis ciliaris var. *ciliaris* (L.) Stapf in Hook. f. Fl. Brit. Ind. 7: 314. 1896.
Erosion ciliaris (L.) Lunell, Am. Midl. Nat. 4: 221. 1915.

Chikwawa District: Chikwawa, common on pathways on river plain, 200 m., October 2, 1946, *17897.* Widespread in tropical Africa and America; also in South Africa, Mascarene Islands, and India.

Eragrostis diplachnoides Steud. Syn. Pl. Glum. 1: 268. 1854.

Eragrostis leprieurii Steud. Syn. Pl. Glum. 1: 269. 1854.
Eragrostis interrupta var. *diplachnoides* (Steud.) Stapf in Hook. f. Fl. Brit. Ind. 7: 316. 1896.

Kota-kota District: Benga, west shore of Lake Nyasa, scattered on sandy beaches, 470 m., Sept. 2, 1946, *17496.* West tropical Africa, Anglo-Egyptian Sudan, Eritrea, Egypt, Belgian Congo, and India.

Eragrostis margaritacea Stapf in Dyer, Fl. Cap. 7: 604. 1900.

Eragrostis angusta Hack. Bull. Herb. Boiss. II. 1: 772. 1901.

Chikwawa District: Lower Mwanza River, occasional on sandy beaches of river, 180 m., October 4, 1946, *17956;* ibid., October 6, 1946, *18003.* Southern Rhodesia, Portuguese East Africa, Bechuanaland, Southwest Africa, and South Africa.

Eragrostis namaquensis Nees, Ind. Sem. Hort. Vratisl. **1835**; Linnaea **11**: Lit.-Ber. 125. 1837; Stapf in Dyer, Fl. Cap. **7**: 630. 1900.

Eragrostis interrupta var. *namaquensis* (Nees) Durand & Schinz, Consp. Fl. Afr. 5: 884. 1895.

Kota-kota District: Benga, west shore of Lake Nyasa, tufted on sandy beaches, 470 m., Sept. 2, 1946, *17497.* Blantyre, along streams in *Brachystegia* woodlands, 1100 m., June 18, 1946, *16358.* West tropical Africa, Anglo-Egyptian Sudan, Abyssinia, and southwards to South Africa.

The Nyasaland specimens represent the habitat state described as var. *robusta* Stapf (in Dyer, Fl. Cap. **7**: 630. 1900).

Eragrostis patens Oliver, Trans. Linn. Soc. 29: 175. 1889.

Blantyre District: Blantyre, in *Brachystegia* woodlands, 1100 m., June 17, 1946, *16346.* French and Belgian Congo, Kenya Colony, and Uganda, southwards to Angola and Southern Rhodesia.

Eragrostis phaeantha C. E. Hubbard, Kew Bull. **1949**: 347. 1949.

Species a *E. macilentae* (A. Rich.) Steud. habitu perenni, foliorum laminis latioribus, glumis et lemmatibus longioribus, lemmatibus a latere visis late lanceolatis vel oblongo-lanceolatis acutis differt.

Gramen perenne caespitosum, circiter 80 cm. altum. *Culmi* numerosi, erecti, validiusculi, teretes vel uno latere sulcati, 5-nodes, e nodis inferioribus ramosi, ramis erectis solitariis, purpurei, nitentes, glabri, laeves. *Foliorum vaginae* glabrae, laevissimae, striatae, inferiores et intermediae persistentes, compressae, carinatae, latiusculae, demum stramineae, internodiis longiores, superiores teretes, internodiis breviores; ligulae ad seriem densam ciliorum brevissimorum redactae; laminae lineares, in apicem gracillimum obtusum gradatim attenutae, usque 35 cm. longae et 1 cm. latae. planae vel siccitate conduplicato-convolutae, firmae vel rigidiusculae, pilis patulis demum deciduis plus minusve pilosae vel glabrescentes vel glabrae, tenuissime nervatae, apicem versus et marginibus scaberulae, ceterum laeves. *Panicula* erecta, laxa, ovato-oblonga, 33 cm. longa, 10 cm. lata; rhachis striata, laevis, glabra, superne flexuosa; rami solitarii, oblique patentes, prope basin et superne laxe divisi, tenuiter filiformes, flexuosi, laeves, usque 12 cm. longi; pedicelli patentes, 10–23 mm. longi, minute et obscure scaberulae. *Spiculae* lanceolato-oblongae vel oblongae, 4–7 mm. longae, circiter 2 mm. latae, 4–8-florae, atro-olivaceae vel nigricantes, glabrae; rhachilla glabra, laevis, continua, internodiis 0.6–0.8 mm. longis. *Glumae* a latere visae lanceolatae, acutae, oblique patentes, demum deciduae, carinatae, carinis scaberulis, tenuiter membranaceae, 1-nerves, subaequales; inferior explanata lanceolata, 2.5–

2.8 mm. longa; superior explanata oblongo-lanceolata, 2.8–3 mm. longa. *Lemmata* erecta, contigua, a latere visa late lanceolata vel oblongo-lanceolata, acuta, explanata elliptico-ovata, 2.5–2.8 mm. longa, supra medium carinata, carinis apicem versus leviter scaberula, ceterum laevia, 3-nervia, nervis lateralibus infra apicem evanescentibus. *Paleae* lemmatibus paullo breviores, oblongae, truncatae, carinis laeves. *Antherae* 3, 1 mm. longae. *Fructus* late elliptico-oblongus, 1–1.2 mm. longus, obtuse quadrangularis, 0.6–0.7 mm. latus, pallide brunneus.

Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent on forest paths and open banks of stream in forest, 1820 m., July 1, 1946, *Brass 16567*.

Tripogon unisetus Pilger, Notizbl. Bot. Gart. Berl. **11**: 654. 1932.

Zomba District: Zomba Plateau, common on an open seepage slope, 1450 m., June 5, 1946, *16238*. Also in southern Tanganyika Territory (Mahenge District).

CHLORIDEAE

Chloris gayana Kunth, Rév. Gram. **1**: 89. 1829, nomen; 293. *pl. 58.* 1830; Stapf in Dyer, Fl. Cap. **7**: 642. 1900.

Chloris abyssinica Hochst. ex.A. Rich. Tent. Fl. Abyss. **2**: 406. 1851.
Chloris glabrata Anderss. in Peters, Reise Mossamb. Bot. 557. 1863.
Eustachys gayana (Kunth) Mundy, Rhod. Agr. Jour. **19**: 142. 1922.

Chikwawa District: Lower Mwanza River, scattered on sandy beaches, 180 m., October 6, 1946, *17996*. Senegal, eastwards to British Somaliland and southwards to Southern Rhodesia and South Africa. Now introduced into most warm countries as a fodder or pasture grass.

SPOROBOLEAE

Sporobolus molleri Hack. Bol. Soc. Brot. **5**: 213. 1888.

S. mayumbensis Franch. Bull. Soc. Hist. Nat. Autun **8**: 367. 1895 (Contri Fl. Congo Franç. 59. 1896).

Zomba District: Zomba Plateau, plentiful in shaded mossy ground about habitations, 1430 m., May 30, 1946, *16087*. Cameroons, French Equatorial Africa, Belgian Congo, and Uganda, southwards to Angola, Southern Rhodesia, and Portuguese East Africa.

PANICEAE

Panicum maximum Jacq. Collect. Bot. **1**: 76. 1786; Ic. Pl. Rar. **1**: 2. *pl. 13.* 1781–1786; Stapf in Prain, Fl. Trop. Afr. **9**: 655. 1920.

Panicum polygamum Sw. Prodr. Veg. Ind. Occ. 24. 1788; non Forssk. 1775.
Panicum laeve Lam. Tab. Encyc. **1**: 172. 1791.
Panicum jumentorum Pers. Syn. **1**: 83. 1805.
Panicum sparsum Schumach. Beskr. Guin. Pl. 64. 1827 (Danske Vidensk. Selsk. Skr. **3**: 84. 1828).
Panicum pamplemoussense Steud. Syn. Pl. Glum. **1**: 71. 1854.
Panicum hirsutissimum Steud. Syn. Pl. Glum. **1**: 72. 1854.
Panicum maximum var. *hirsutissimum* (Steud.) Oliver, Trans. Linn. Soc. **29**: 171. 1875.
Panicum giganteum Mez, Bot. Jahrb. **34**: 143. 1904.

Chikwawa District: Lower Mwanza River, scattered on sandy beaches, 180 m., October 4, 1946, *17954*; ibid., October 6, 1946, *18023*. Frequent in tropical and South Africa; also in tropical Arabia and the Mascarene Islands; now introduced into and naturalised in most warm countries.

Brass' specimens represent two variants of this exceedingly polymorphic species; *17954* possessing larger more or less acute spikelets and a few fine white hairs near the tips of the pedicels, whereas *18023* has obtuse spikelets up to 2.5 mm. long and glabrous pedicels.

Panicum meyerianum Nees, Fl. Afr. Austr. 32. 1841; Stapf in Prain, Fl. Trop. Afr. 9: 650. 1920.

Panicum schimperianum Hochst. ex A. Rich. Tent. Fl. Abyss. 2: 371. 1851.
Panicum mite Steud. Syn. Pl. Glum. 1: 68. 1854.
Helopus meyerianus (Nees) Doell in Mart. Fl. Bras. 2^2: 189. 1877, in obs.
Eriochloa borumensis Hack. Bull. Herb. Boiss. II. 1: 765. 1901.

Chikwawa District: Lower Mwanza River, scattered on sandy beaches, 180 m., October 10, 1946, *18000.* Throughout east Africa from the Anglo-Egyptian Sudan to Natal; also in tropical Arabia (Yemen).

Hackel's specimen of *Eriochloa borumensis* Hack. (Portuguese East Africa, Boruma, *Menyharth 1114),* in the Herbarium of the Botanical Institute of the University of Vienna was examined in 1938; it agrees with the author's description and represents the same species as *Panicum meyerianum* Nees. This explains the discrepancy noted by Stapf in a footnote to his description of *Eriochloa borumensis* (Prain, Fl. Trop. Afr. 9: 501, 1919), in which he observed that Menyharth's specimens, (examples of which he had studied and described in the Zurich Herbarium) were destitute of the little awnlets present in Allen's and Kirk's specimens, and also that the lower glume was more distinctly developed. Stapf's description is largely based on Menyharth's specimens, but includes structural details obtained from the other specimens cited by him; these specimens represent a new species of *Eriochloa.*

Panicum monticola Hook. f. Jour. Linn. Soc. Bot. 7: 226. 1864.

P. mannii Mez, Bot. Jahrb. 34: 143. 1904.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common on paths in forest, 1820 m., July 1, 1946, *16570;* ibid., in broken shade in forest, 1890 m., July 7, 1946, *16713.* Cameroons Mountain; mountains of Uganda, Belgian Congo, and Tanganyika Territory.

Although the Nyasaland specimens differ from the Cameroons Mountain type-material in the relatively narrower and longer leaf-blades, and in the shorter oblate nerveless lower glume, they are connected by a series of intermediates from other east African mountains.

P. phragmitoides Stapf in Prain, Fl. Trop. Afr. 9: 677. 1920.

North Nyasa District: Nchena-chena, clearing in *Brachystegia* woodland, 1340 m., August 21, 1946, *17378.* French Guinea, Nigeria, French Equatorial Africa, through the Cameroons and Belgian Congo to Portuguese East Africa and Angola.

The name *P. phragmitoides* Stapf was listed without description by A. Chevalier (Sudania 74, 76. 1911).

Sacciolepis chevalieri Stapf in Prain, Fl. Trop. Afr. 9: 754. 1920.

Kota-kota District: Chia area; frequent on moist edges of marshes, 480 m., Sept. 1, 1946, *17471.* French Sudan, French Equatorial Africa, and Uganda.

Setaria grandis Stapf in Prain, Fl. Trop. Afr. 9: 832. 1930.

North Nyasa District: Nyika Plateau, about 3 m., high, forming large clumps on banks of grassland streams, 2300 m., August 14, 1946, *17229.* Endemic.

Brass' specimen is only the third collection of this remarkable species of *Setaria,* the first—the TYPE in the British Museum Herbarium—having been made by Henderson on the Nyika Plateau in November 1908, in marshy ground about 10 miles west of the north-western shore of Lake Nyasa at an altitude of between 2100 and 2340 m. The second gathering was made by B. C. Charles on January 1st, 1938, who found it at an altitude of about 2400 m., on the same plateau. He reports that the grass is known as "Kararanyika" (Chitumbuka) and reputed to be poisonous to cattle.

Setaria phragmitoides Stapf in Prain, Fl. Trop. Afr. 9: 782. 1930.

Chikwawa District: Lower Mwanza River, scattered on sandy beaches, 180 m., October 6, 1946, *18017*. Also in Portuguese East Africa, Northern and Southern Rhodesia.

Setaria sphacelata (Schumach.) Stapf & Hubbard ex M. B. Moss, Kew Bull. **1929**: 195. 1929; in Prain, Fl. Trop. Afr. 9: 795. 1930.

Panicum sphacelatum Schumach. Beskr. Guin. Pl. 58. 1827 (Danske Vidensk. Selsk. Skr. 3: 38. 1828).
Setaria aurea Hochst. ex A. Br. Flora 24^1: 276. 1841.
Pennisetum aureum (Hochst.) A. Rich. Tent. Fl. Abyss. 2: 378. 1851.
Panicum chrysanthum Steud. Syn. Pl. Glum. 1: 50. 1854.
Panicum rudimentosum Steud. Syn. Pl. Glum. 1: 51. 1854.
Setaria rudimentosa (Steud.) Durand & Schinz, Consp. Fl. Afr. 5: 774. 1895.
Chaetochloa aurea (Hochst.) Hitchc. Proc. Biol. Soc. Wash. 29: 128. 1916.

Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent on grassy flood-banks of forest streams, 1820 m., July 5, 1946, *16674*. Widespread in tropical Africa and in South Africa.

Setaria splendida Stapf in Prain, Fl. Trop. Afr. 9: 799. 1930.

Mlanje District: Likubula Gorge; lower western slopes of Mlanje Mountain, moist rocky bank of river, 840 m., June 20, 1946, *16387*. In moist situations from French Equatorial Africa and the Anglo-Egyptian Sudan to Southern Rhodesia and South Africa.

Paspalidium geminatum (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9: 583. 1920.

Panicum geminatum Forssk. Fl. Aegypt.-Arab. 18. 1775.
Panicum fluitans Retz. Obs. Bot. 3: 8. 1783.
Paspalum appressum Lam. Tab. Encyc. 1: 176. 1797.
Digitaria appressa (Lam.) Pers. Syn. 1: 85. 1805.
Panicum beckmanniaeforme Mikan. ex. Trin. in Spreng. Neue Entdeck. 2: 83. 1821.
Panicum truncatum Trin. Gram. Pan. 130. 1826.
Panicum brizaeforme Presl. Rel. Haenk. 1: 302. 1830.
Panicum appressum (Lam.) Doell in Mart. Fl. Bras. 2^2: 184. 1877.

Chikwawa District: Lower Mwanza River, gregarious on moist silt, 180 m., October 6, 1946, *18001*. Warm regions of both hemispheres; Egypt, Canary and Cape Verde Islands, tropical Africa; Mascarene Islands; India; tropical and subtropical America.

Oplismenus compositus (L.) Beauv. Agrost. 54, 168, 169, 1812; Stapf in Prain, Fl. Trop. Afr. 9: 634. 1920.

Panicum compositum L. Sp. Pl. 57, 1753.

Kota-kota District: Nchisi Mountain, locally abundant as ground cover in rain-forest, 1550 m., July 30, 1946, *17044*. Tropical east Africa, from Eritrea to Portuguese East Africa and Southern Rhodesia; Mascarene Islands; tropical and subtropical Asia, Australia, and Polynesia.

Oplismenus hirtellus (L.) Beauv. Agrost. 54, 168, 169, 1812: Stapf in Prain, Fl. Trop. Afr. 9: 631. 1920.

Panicum hirtellum L. Syst. Nat. ed. 10. 2: 870. 1759.

Cholo District: Cholo Mountain, occasional in small clumps in rain-forest, 1350 m., Sept. 26, 1946, *17815*. Tropical America; tropical and South Africa; Mascarene Islands; Polynesia.

Brass' specimens represent the form with few-spiculate racemes described as *Oplismenus capensis* Hochst. (Flora 29: 114. 1846) and *O. africanus* Beauv. var. *capensis* (Hochst.) Stapf (in Dyer, Fl. Cap. 7: 417. 1899).

Chloridion cameronii Stapf in Hook. Ic. Pl. 27: *pl. 2640.* 1900; in Prain, Fl. Trop. Afr. 9: 480. 1919.

Stereochlaena jeffreysii Hack. Proc. Rhod. Sci. Assoc. 7: 2, 66. 1908.
Stereochlaena cameronii (Stapf) Pilger in Engl. & Prantl, Nat. Pflanzenf. ed. 2. **14e**: 45. 1940.

Zomba District: Zomba Plateau, in shallow soil on seepage-wet rocks, common, 1800 m., May 31, 1946, *Brass 16140.* Kota-kota District: Nchisi Mountain, plentiful on seepage-wet soil in *Brachystegia* woodland, 1400 m., August 1, 1946, *Brass 17097;* ibid., occasional on dry slopes in *Brachystegia* woodland, 1400 m., August 5, 1946, *Brass 17137.* Also in Northern and Southern Rhodesia, and Bechuanaland.

Because *Chloridion* Stapf (1900) is a variant spelling of *Chloridium* Link (Obs. Mycol. 1: 11, 1809), Weatherby (Kew Bull. 1935, 406) considers that the former should be renamed. Accordingly Pilger in his recent account of the genera of the Paniceae, has used *Stereochlaena* Hack. in place of *Chloridion* Stapf. If, however, one follows the recommendations in the International Rules, ed. 3, Art. 70, pp. 22–23 (1935), surely there is no more likelihood of confusing *Chloridion* Stapf with *Chloridium* Link, than there is in the cases of *Desmostachys* and *Desmostachya, Peltophorus* and *Peltophorum,* which are given as examples of different generic names. Moreover, in his review of changes made in the International Rules of Botanical Nomenclature by the Seventh International Botanical Congress at Stockholm in 1950, De Wit (Fl. Males. Bull. 7: 221. 1950) gives the following addition to Article 70: "When two or more generic names are so similar and the plants so closely related that they may be confused, one name should be rejected." This apparently sanctions the use of both *Chloridium* and *Chloridion,* since the groups to which they belong, Fungi and Gramineae respectively, are so very different.

Melinis ambigua Hack. Oesterr. Bot. Zeitschr. **51**: 462. 1901; Stapf & Hubbard in Prain, Fl. Trop. Afr. **9**: 921. 1930.

Zomba District: Zomba Plateau, common in *Brachystegia* woodlands, 1500 m., June 2, 1946, *16149.* Abyssinia, southwards to Southern Rhodesia.

Melinis longicauda (Mez) Mez ex Stapf & Hubbard in Prain, Fl. Trop. Afr. 9: 919. 1930.

Panicum longicauda Mez, Bot. Jahrb. **34**: 133. 1904.
Rhynchelytrum longicaudum (Mez) Chiov. Nuovo Gior. Bot. Ital. II. 26: 78. 1919.

Kota-kota District: Nchisi Mountain, tufted on flat rocks in *Brachystegia* woodland, 1400 m., August 1, 1946, *17092.* Also in southern Tanganyika Territory, Portuguese East Africa, and Southern Rhodesia.

Melinis macrochaeta Stapf & Hubbard, Kew Bull. **1926**: 443. 1926; in Prain, Fl. Trop. Afr. **9**: 927. 1930.

Zomba District: Zomba Plateau, common in crevices on exposed rocks, 1500 m., June 6, 1946, *16290.* Northern Nigeria and the Anglo-Egyptian Sudan, southwards to Angola and Southern Rhodesia.

Melinis maitlandii Stapf & Hubbard, Kew Bull. **1926**: 445. 1926; in Prain, Fl. Trop. Afr. **9**: 930. 1930.

Zomba District: Zomba Plateau, occasional large clumps in open rocky situations, 1500 m., June 2, 1946, *16150.*

A form with short-awned or awnless spikelets. A similar form has been collected in Uganda, where the typical form also occurs.

Beckeropsis uniseta (Nees) Stapf ex Robyns, Bull. Jard. Bot. Brux. 9: 199. 1932; in Prain, Fl. Trop. Afr. 9: 949. 1934.

Gymnothrix uniseta Nees, Fl. Afr. Austr. 66. 1841.
Pennisetum unisetum (Nees) Benth. Jour. Linn. Soc. Bot. **19**: 47, 49. 1881.
P. kirkii Stapf Kew Bull. **1897**: 286. 1897.

Cholo District: Cholo Mountain, common in old gardens in rain-forest, 1200 m., native name:- "Sipi" (Chinyanja), Sept. 28, 1946, *17857*. Throughout tropical Africa and in Natal.

Pennisetum purpureum Schumach. Beskr. Guin. Pl. 44. 1827 (Danske Vidensk. Selsk. Skr. 3: 64. 1828); Stapf & Hubbard in Prain, Fl. Trop. Afr. 9: 1016. 1934.

Pennisetum macrostachyum Benth. in Hook. Niger Fl. 563. 1849.
Pennisetum benthamii Steud. Syn. Pl. Glum. **1**: 105. 1854.
Gymnothrix nitens Anderss. in Peters, Reise Mossamb. Bot. 552. 1863..
Pennisetum benthamii Steud. vars. *nudum, sambesiense, ternatum* Hack. ex Schinz, Denkschr. Akad. Wiss. Wien **78**: 400. 1905 (repr. p. 34).
Pennisetum nitens (Anderss.) Hack. Bol. Soc. Brot. **6**: 142. 1888.
Pennisetum flexispica K. Schum. in Engl. Pflanzenw. Ost-Afr. C: 105. 1895.
Pennisetum flavicomum Leeke, Zeitschr. Naturwiss. **79**: 45. 1907.
Pennisetum pallescens Leeke, Zeitschr. Naturwiss. **79**: 47. 1907.
Pennisetum pruinosum Leeke, Zeitschr. Naturwiss. **79**: 46. 1907.

Kota-kota District: Nchisi, on termite mound in *Brachystegia* woodland, 1350 m., August 2, 1946, *17100*. Chikwawa District: Lower Mwanza River, common on sandy beaches, 180 m., native name:- "senjeri" (Chinyanja), August 4, 1946, *17955*. Frequent in tropical Africa from French Guinea eastwards to the Anglo-Egyptian Sudan and southwards to Angola and Southern Rhodesia; introduced and cultivated for fodder in many warm countries.

ANDROPOGONEAE

Eriochrysis pallida Munro in Harvey, Gen. S. Afr. Pl. ed. 2. 440. 1868; Stapf in Prain, Fl. Trop. Afr. 9: 93. 1917.

Saccharum munroanum Hack. in D.C. Monogr. Phan. **6**: 124. 1889.
Eriochrysis munroana (Hack.) Pilger, Notizbl. Bot. Gart. Berl. **11**: 648. 1932.

Kota-kota District: Nchisi Mountain, in marshy *Brachystegia* woodland, 1400 m., July 28, 1946, *17008*. Eastern Shari, Tanganyika Territory, Northern and Southern Rhodesia, Angola, and South Africa.

Both Hackel and Pilger treat *E. pallida* Munro as a nomen nudum, although Munro supplied a short specific description.

Andropterum stolzii (Pilger) C. E. Hubbard, comb. nov.

Ischaemum stolzii Pilger, Bot. Jahrb. **54**: 280. 13 Mr 1917.
Andropterum variegatum Stapf in Prain, Fl. Trop. Afr. **9**: 38. 1 Jl 1917.

Kota-kota District: Nchisi Mountain, tangled stands on wet ground in woodland gullies, 1350 m., August 1, 1946, *17086*. Also in southern Tanganyika Territory (Kyimbila District).

Ischaemum purpurascens Stapf in Prain, Fl. Trop. Afr. 9: 32. 1917.

Zomba District: Zomba Plateau, gregarious on moist open riverbanks, 1500 m., June 7, 1946, *16300*. Tanganyika Territory, Northern and Southern Rhodesia, Angola, Transvaal, and Madagascar.

Andropogon amplectens Nees, Fl. Afr. Austr. 104. 1841; Stapf in Prain, Fl. Trop. Afr. 9: 243. 1919.

Kota-kota District: Nchisi Mountain, sporadic in *Brachystegia* woodland, 1400 m., July 24, 1946, *16917*. Kenya Colony, southwards to Angola and South Africa.

A. schirensis Hochst. ex A. Rich. Tent. Fl. Abyss. 2: 456. 1851; Stapf in Prain, Fl. Trop. Afr. 9: 246. 1919.

A. congoënsis Franch. Bull. Soc. Hist. Nat. Autun 8: 325. 1895 (Contr. Fl. Congo Franç. 17. 1896).

Zomba District: Zomba Plateau, frequent in *Brachystegia* woodlands, 1430 m., May 30, 1946, *16100*. Widespread throughout tropical Africa.

Andropogon sylvaticus C. E. Hubbard, Kew Bull. 1949: 371. 1949.

Species a *A. pseudoschinzii* Stapf vaginis pilosis, ligulis auriculis et aristis brevioribus, laminis latioribus, internodiis rhacheos et pedicellis pilis longioribus ciliatis, spiculis longioribus differt.

Gramen perenne, caespitosum, 1–1.3 m. altum; innovationes extravaginales; gemmae et bases culmorum cataphyllis latis brevibus coriaceis striatis inter strias appresse pubescentibus ceterum glabris obtectae. *Culmi* erecti, graciliusculi, teretes, usque 2 mm. diametro, rigidi, 8–9-nodes, inferne simplices, superne sparse ramosi, glabri, laeves, internodio supremo (pedunculo) gracillimo. *Foliorum vaginae* internodiis longiores, plerumque arcte appressae, teretes, firmae, pilis mollibus laxe pilosae, vel inferiores glabrescentes, apice auriculatae, auriculis erectis angustis usque 3 mm. longis ligulae adnatis; ligulae emarginatae, usque 3 mm. longae, firme membranaceae; laminae anguste lineares, basi angustae, in acumen tenuissimum longe attenuatae, usque 35 cm. longae et 6 mm. latae, planae vel siccitate convolutae, sparse pilosae vel glabrescentes, supra nervosae, nervis minutissime hispidae vel scaberulae, marginibus scabridae, costa media gracillima. *Racemi* bini, circiter 8 cm. longi, graciliusculi, stricti vel leviter curvati, purpurascentes, villosi, alter sessilis, alter base gracillima 8–10 mm. longa leviter pubescente vel puberula fultus; internodia rhacheos et pedicelli aequales vel fere aequales, 5–6 mm. longi, lineari-obcuneati, pilis albis usque 3 mm. longis dense ciliati, apice oblique cupulati et emarginati vel minute dentati. *Spiculae sessiles* a latere valde compressae, a fronte visae lineares, 7.5–8 mm. longae; callus brevissimus, pilis usque 1.5 mm. longis dense barbatus. *Glumae* subaequales; inferior a dorso visa lineari-lanceolata, apice angustata, explanata oblonga et apice emarginata vel minute bidentata, dorso profunde canaliculata, praeter carinas 4–6-nerves coriaceas enervis et translucens, carina superne setuloso-ciliata, inferne glabra et laevis; superior navicularis, supra medium carinata, explanata ovata et obtusa vel minutissime biloba, scariosa, marginibus ciliolata, carina apicem versus scabrida, ceterum glabra, 3-nervis, apice aristata, arista stricta vel flexuosa tenuissima usque 5 mm. longa. *Anthoecium inferum*: lemma lanceolato-oblongum, obtusum, glumis paullo brevius, tenuiter membranaceum, hyalinum, 2-nerve, marginibus ciliolatum. *Anthoecium superum*: lemma eo anthoecii inferi fere aequilongum, ovato-oblongum, acute bilobum, tenuiter membranaceum, hyalinum, 3–5-nerve, marginibus ciliolatum, aristatum; arista usque 15 mm. longa, minute scaberula, geniculata, columna usque 6 mm. longa. *Spiculae pedicellatae* elliptico-oblongae, acutae, 7–8 mm. longae, dorso compressae. *Gluma inferior* chartacea, 13–17-nervis, carinis setuloso-ciliata, dorso praecipue margines et apicem versus scaberula, apice aristata, arista stricta vel curvata tenuissima minute scaberula usque 5 mm. longa; gluma superior elliptico-ovata, 3–5-nervis, membranacea, marginibus ciliolata, apice breviter aristata (arista usque 3 mm. longa) vel mucronata vel mutica. *Lemmata* oblonga, acuta, tenuiter membranacea, hyalina, mutica, marginibus ciliolata; inferum 2–3-nerve; superum 3–5-nerve. *Antherae* 3 mm. longae.

Zomba District: Zomba Plateau, common perennial clump grass of *Brachystegia* woodlands, 1430 m., May 30, 1946, *16098*.

Hyparrhenia bracteata (Humb. & Bonpl. ex Willd.) Stapf in Prain, Fl. Trop. Afr. 9: 360. 1919.

Andropogon bracteatus Humb. et Bonpl. ex Willd. Sp. Pl. 4: 914. 1806.
Cymbopogon bracteatus (Humb. et Bonpl. ex Willd.) Hitchc. Contr. U. S. Nat. Herb.17: 209. 1913.

Kota-kota District: Nchisi Mountain, in marshy ground in *Brachystegia* woodland, 1400 m., July 25, 1946, *16934*; ibid., common in moist situations in *Brachystegia* woodland, 1400 m., July 27, 1946, *16975*. Tropical Africa; Nigeria and Uganda, southwards to Angola and Southern Rhodesia; tropical America.

H. cymbaria (L.) Stapf in Prain, Fl. Trop. Afr. 9: 332. 1919.

Andropogon cymbarius L. Mant. 303. 1771.
Cymbopogon cymbarius (L.) Rendle, Jour. Linn. Soc. Bot. 38: 241. 1908.

Zomba District: Zomba Plateau, common in *Brachystegia* woodlands, 1500 m., June 6, 1946, *16275*. Frequent in tropical Africa from the Cameroons, Anglo-Egyptian Sudan, and Eritrea southwards to Angola and Southern Rhodesia; also in South Africa, Comoro Islands, and Madagascar.

H. gazensis (Rendle) Stapf in Prain, Fl. Trop. Afr. 9: 301. 1919.

Cymbopogon gazense Rendle, Jour. Linn. Soc. Bot. 40: 226. 1911.
Andropogon gazensis (Rendle) Eyles, Trans. Roy. Soc. S. Afr. 5: 295. 1916.

Zomba District: Zomba Plateau, abundant in *Brachystegia* woodlands, 1500 m., June 6, 1946, *16288*. Kota-kota District: Nchisi Mountain, one of the principal grasses on moist parts of *Brachystegia* woodland, 1400 m., August 1, 1946, *17090*. Also in Portuguese East Africa, Northern and Southern Rhodesia.

H. lecomtei (Franch.) Stapf in Prain, Fl. Trop. Afr. 9: 361. 1919.

Andropogon lecomtei Franch. Bull. Soc. Hist. Nat. Autun 8: 329. 1895. (Contr. Fl. Congo Franç. 21. 1896).
Cymbopogon lecomtei (Franch.) Rendle in Jour. Linn. Soc. Bot. 40: 227. 1911.

Zomba District: Zomba Plateau, a common grass of the *Brachystegia* woodlands, 1430 m., May 30, 1946, *16093*. Cameroons, French and Belgian Congo, southwards to Gazaland.

Exotheca abyssinica (Hochst. ex A. Rich.) Anderss. Nov. Acta. Soc. Sci. Upsal. III. 2: 253. 1858; Stapf in Prain, Fl. Trop. Afr. 9: 384. 1919.

Anthistiria abyssinica Hochst. ex A. Rich. Tent. Fl. Abyss. 2: 449. 1851.
Andropogon exothecus Hack. in DC. Monogr. Phan. 6: 632. 1889.

North Nyasa District: Nchena-chena Spur, Nyika Plateau, one of the most important species of the plateau proper, dominant in open grasslands, 2100 m., August 20, 1946, *17344*. Mlanje District: Mlanje Mountain; Luchenya Plateau, common in grasslands, 1890 m., July 13, 1946, *16817*. A constituent of mountain grasslands in tropical east Africa from Eritrea and the Anglo-Egyptian Sudan southwards to Nyasaland.

Themeda triandra Forssk. (Fl. Aegypt.-Arab. 178. 1775) var. **hispida** Stapf in Prain, Fl. Trop. Afr. 9: 418. 1919.

Anthistiria ciliata L.f. var. *hispida* Nees. Fl. Afr. Austr. 121. 1841.

Kota-kota District: Nchisi Mountain, one of the chief grasses of *Brachystegia* woodlands, 1400 m., August 1, 1946, *17091*. Common in tropical east Africa from the Anglo-Egyptian Sudan southwards to Southern Rhodesia and in Angola and South Africa.

Additions and Corrections

8: 214. *Artabotrys cf. monteiroae.* The number of the specimen *Greenway & Trapnell 5770* should be *5570.*

8: 437. *Combretum imberbe.* Add Angola to range.

8: 438. *Combretum mechowianum.* Add Angola to range.

8: 448. *Pentas sp. aff. purpurea* Oliv. Verdcourt, Bull Jard. Bot. Brux. 23: 327 (1953), has made *16447* the type of a new variety, *Pentas zanzibarica* (Klotzsch) Vatke var. *milangiana* Verdc.

8: 457. *Galium bussei* var. *glabrum.* The specimen cited *Lynes I.4.93* should be *Lynes I. h. 93.*

8: 502. *Landolphia buchanani.* The doubt expressed in the note is resolved by Pichon, Monographie des Landolphiées (Mem. Inst. Franç. Afr. Noire 35:) 8 (1953), who makes *Landolphia cameronis* synonymous with *L. buchanani.*

8: 505. *Pergularia barbata.* Add S. Rhodesia to the range.

9: 12. Under *Buchnera peduncularis*, last line of diagnosis, instead of

"... corollae tubo extra glabro,"
read
"... corrollae tubo extra pubescenti."

9: 99. *Coleochloa.* Since this paper was prepared for publication, several years ago, I have revised the genus *Coleochloa* (Kew Bull. 1953: 373. 1953). As a result, two small alterations are necessary. *Coleochloa oliveri* (Bŏck.) Gilly (p. 99) now becomes a synonym of *C. setifera* (Ridley) Gilly, to which species also belongs the immature plant which I could not formerly precisely identify (p. 100).—E. NELMES.

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MEMOIRS

OF

THE NEW YORK BOTANICAL GARDEN

VOL. 9, NO. 2

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PLANTS COLLECTED IN ECUADOR BY W. H. CAMP
GRAMINEAE

ERNEST R. SOHNS AND JASON R. SWALLEN

The collection of Ecuadorian plants made by Dr. W. H. Camp in 1944–45, principally in the provinces of Pichincha, León, Chimborazo, Cañar, and Azuay, included 153 specimens of grasses representing 55 genera and 106 species. Of these, ten are new to Ecuador, and three new to science.

The specimens cited are deposited in the U. S. National Herbarium and in the Herbarium of the New York Botanical Garden (except for unicates, which are indicated as "NY only").

Dr. F. A. McClure identified the Bambuseae.

All collection-numbers are Camp's unless ascribed to another.

Arundinaria patula Pilger, Bot. Jahrb. 25: 719. 1898.

AZUAY: Nudo de Portete; pass between headwaters of the Rios Tarqui (Atlantic) and Giron (Pacific), ca. 9000 ft, *E-2177*. "Zadilla." In combination with the outer part of the "caña" (*Arundo*), used in manufacture of baskets, etc.

Arthrostylidium harmonicum Parodi, Physis 19: 479. *f. 1.* 1944.

SANTIAGO-ZAMORA ("Oriente"): Eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), Tambo Consuelo to Tambo Cerro Negro, 8000–9600 ft, *E-1613*.

New to Ecuador. Described from Pintobambo, Cuzco, Peru (*Vargas 3260*).

Arthrostylidium racemiflorum Steud. Syn. Pl. Glum. 1: 336. 1854.

Junction of GUAYAS, CAÑAR, CHIMBORAZO, and BOLIVAR: Foothills of the western cordillera near the village of Bucay, 1000–1250 ft, *E-3814*. Thin-stemmed, vine-like plants; looping 20–25 m in secondary jungle (i.e. branches scrambling in one tree, then falling out and downward, touching another tree and scrambling upward again). Apparently all in flower at the same time.

This is the first record of the species for Ecuador. Mexico to Panamá; Venezuela, British Guiana, Colombia, and Peru.

Chusquea scandens Kunth, Syn. Pl. Aequin. 1: 254. 1822.

AZUAY-"ORIENTE" border: Páramo del Castillo and surrounding forested areas (crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez), 9000–11,000 ft, *E-707*. AZUAY: Eastern cordillera, 1–8 km north of the village of Sevilla de Oro, 8000–9000 ft. Large mounds on banks, canes to 7 m long. Stems solid. Leaves deep green above, very pale below. Large areas in flower, or past and plants dead. Quichua name: "Suru." It is said by the local people—and Prieto verified this statement—that the plant grows for about a period of 7 years, flowers, and then dies. If, however, the plant is cut near the ground just before its flowering period, the plant will sprout freely but the sprouts will not die on schedule. It is quite obvious that the flowering cycle is more or less regional, for large areas near Sevilla de Oro were in flower or had just passed, leaving large openings in the forest. Yet, at the same time, some few plants seemed to be coming into their full period of vegetative growth. Prieto says that the name "Suru" is applied only to the solid-stemmed plants and that two distinct species are recognized: This (which is the high elevation one), and another at lower elevations (7000–9000 ft) which is very coarse, with culms to 5 cm in diameter, called "Urcu-Suru." *E-4247*. CAÑAR: Uplands called "Huairacaja," 10–20 km northeast of Azogues, 11,000 ft., *E-1778*, *E-1824*.

Chusquea serrulata Pilger, Bot. Jahrb. 25: 719. 1898.
AZUAY: Ridge between El Pan and Guachapala, 7500–9800 ft, *E-5259*. Large clumps to 6 m high, stems arching. "Suru."

Chusquea sp. affinis *C. spadicea* Pilger, Bot. Jahrb. 27: 35. 1899.
AZUAY: The eastern cordillera, 4–6 km north of the village of Sevilla de Oro, 9000–10,000 ft, *E-4764*. Large spreading plants in colonies; stems solid, arching, to 8 m. This, and series of very similar colonies in vicinity, stood out from the general "Suru" population because of marked difference in glume color.

Neurolepis acuminatissima (Munro) Pilger in Engl. & Prantl, Nat. Pflanzenfam. Ergänz. 2: 21. 1906.
AZUAY-"ORIENTE" border: Páramo del Castillo and surrounding forested areas (crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez), 11,000–11,300 ft, *E-4883*. "Nacran." Used for thatching. AZUAY: Páramo and sub-páramo area north and northwest of the Páramo del Castillo (ca. 6–8 km n-ne of Sevilla de Oro), 10,000–11,200 ft, *E-5142*.

Camp E-3393 represents a species of a new genus of bamboos being described by Dr. F. A. McClure.

Bromus haenkeanus (Presl) Kunth, Rév. Gram. 1: Suppl. XXXII. 1830; Enum. Pl. 1: 416. 1833.
CAÑAR: Dry chaparral scrub and páramo, with occasional moist valleys, near El Tambo (ca. 69 km by RR south of Sibambe), 9500–10,000 ft, *E-2922* (collected by Giler & Prieto). PICHINCHA: Waste places in city of Quito, *E-1750*.

Bromus pitensis H.B.K. Nov. Gen. & Sp. 1: 152. 1815.
CAÑAR: Near the village of San Marcos (5–8 km northeast of Azogues), Parroquia Luis Cordero, *E-2499* (collected by Prieto). "Alco-micuna:" *Alco*—dog; *micuna*—to chew or eat. Dogs seem to chew this grass when sick.

Festuca eminens Kunth, Rév. Gram. 1: 132. 1829.
CHIMBORAZO: Cañon of the Río Chanchan, about 5 km north of Huigra, 5000–6500 ft (moist forested valleys in the afternoon fogbelt), *E-3327*.

Festuca megalura Nutt. Jour. Acad. Phila. II. 1: 188. 1848.
CAÑAR: Dry chaparral scrub and páramo, with occasional moist valleys, near El Tambo (ca. 69 km by RR south of Sibambe), 9500–10,000 ft, *E-2908* (collected by Giler & Prieto).

Poa annua L. Sp. Pl. 68. 1753.
PICHINCHA: Waste places in city of Quito, *E-1742*.

Gynerium sagittatum (Aubl.) Beauv. Ess. Agrost. 138, 153. *pl. 24, f.* 6. 1812.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft, (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3171*. NAPO-PASTAZA ("Oriente"): Valley of the Río Pastaza and adjacent uplands, between Baños and Mera, 3500–5000 ft, common in flood plain of river and in seepages along sides, *E-2386*.

Cortaderia rudiuscula Stapf, Gard. Chron. III. 22: 396. 1897.
AZUAY: Along the Río Cumbe (25–30 km south of Cuenca), 9300–10,000 ft, *E-2210*. Coarse clumps on steep slopes. Flowering culms to 2.5 m. "Zigzal" or "Sigsig"?

Eragrostis amabilis (L.) Wight & Arn. ex Nees in Hook. & Arn. Bot. Beechey Voy. 251. 1838.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3194*.

Eragrostis ciliaris (L.) R. Br. in Tuckey, Narr. Exp. Congo App. 478. 1818.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft, (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-2950*.

Eragrostis montufari (H.B.K.) Steud. Nom. Bot. ed. 2. 1: 563. 1840.
AZUAY: Between Ríos Azogues and Gualaceo, valley of the Río Paute, between Paute and Cuenca, 7200–8000 ft. (dry cliffs, rocky hillsides and occasional ravines), *E-2327*. CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft. (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3101*.

Eragrostis nigricans (H.B.K.) Steud. Nom. Bot. ed. 2. 1: 563. 1840.
PICHINCHA: Waste places in city of Quito, *E-1745*.

Eragrostis pastoensis (H.B.K.) Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 2^1: 71. 1836.
PICHINCHA: Waste places in city of Quito, *E-1748*.

Eragrostis patula (H.B.K.) Steud. Nom. Bot. ed. 2. 1: 564. 1840.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-2939*. PICHINCHA: Waste places in city of Quito, *E-1747*.

Melica scabra H.B.K. Nov. Gen. & Sp. 1: 164. 1816.
AZUAY: Between Ríos Azogues and Gualaceo, valley of the Río Paute, between Paute and Cuenca (dry cliffs, rocky hillsides and occasional ravines), 7200–8000 ft, *E-2308*. CAÑAR: Dry chaparral scrub and páramo, with occasional moist valleys, near El Tambo (ca. 69 km by RR south of Sibambe), 9500–10,000 ft, *E-2912, E-2916, E-2928* (collected by Giler & Prieto). CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3104*. In small, tufted colonies, culms scrambling through low shrubs of chaparral.

Orthoclada laxa (Rich.) Beauv. ex Nees, Agrost. Bras. 522. 1829.
SANTIAGO-ZAMORA ("Oriente"): Near Mendez, 1750–2500 ft, lower plain of Río Upano, near Chupiantza, *E-1023*.

Uniola condensata Hitchc. Contr. U. S. Nat. Herb. 24: 345. 1927.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-2965*.

Agropyron attenuatum (H.B.K.) Roem. & Schult. Syst. Veg. 2: 751. 1817.
CAÑAR: Dry chaparral scrub and páramo, with occasional moist valleys, near El Tambo (ca. 69 km by RR south of Sibambe), 9500–10,000 ft, *E-2917* (collected by Giler & Prieto; NY only).

Cynodon dactylon (L.) Pers. Syn. Pl. 1: 85. 1805.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-2937*.

Chloris radiata (L.) Swartz, Prodr. Veg. Ind. Occ. 26. 1788.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-2938*. SANTIAGO-ZAMORA ("Oriente"): Near Mendez, 1750–2500 ft, *E-862*.

Bouteloua disticha (H.B.K.) Benth. Jour. Linn. Soc. Bot. 19: 105. 1881.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-2949, E-2988, E-3033.*

Bouteloua simplex Lag. Var. Cienc. 4: 141. 1805.
CAÑAR: Dry chaparral scrub and páramo, with occasional moist valleys, near El Tambo (ca. 69 km by RR south of Sibambe), 9500–10,000 ft, *E-2925* (collected by Giler & Prieto).

Aegopogon cenchroides Humb. & Bonpl. in Willd. Sp. Pl. 4: 899. 1806.
AZUAY: Valley of the Río Paute, between Paute and Cuenca, 7200–8000 ft (dry cliffs, rocky hillsides and occasional ravines), *E-2315.* CAÑAR: Near the village of San Marcos (5–8 km northeast of Azogues), Parroguia Luis Cordero, *E-2503* (collected by Prieto). "Pajilla," used commercially as packing for saddle-pads.

Eleusine indica (L.) Gaertn. Fruct. & Sem. 1: 8. 1788.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3044.* SANTIAGO-ZAMORA ("Oriente"): Near Mendez, 1750–2500 ft, *E-863.*

Leptochloa virgata (L.) Beauv. Ess. Agrost. 71, 161, 166. *pl. 15, f. 1.* 1812.
SANTIAGO-ZAMORA ("Oriente"): Near Mendez, 1750–2500 ft, *E-910.*

Holcus lanatus L. Sp. Pl. 1048. 1753.
AZUAY: Along the Río Cumbe (25–30 km south of Cuenca), 9300–10,000 ft, *E-2203, E-2206.*

Trisetum deyeuxioides (H.B.K.) Kunth, Rév. Gram. 1: 102. 1829.
CHIMBORAZO: Cañon of the Río Chanchan, 5000–7000 ft (open deforested slope with small patches of scrub in the draws, directly above the village of Huigra), *E-3479.*

Trisetum spicatum (L.) Richt. Pl. Eur. 1: 59. 1890.
CAÑAR: Near the village of San Marcos (5–8 km northeast of Azogues), Parroquia Luis Cordero, *E-2483* (collected by Prieto).

Avena fatua L. Sp. Pl. 80. 1753.
AZUAY: Quebradas leading into the Río Collay, 3–8 km north of Sevilla de Oro, 7000–8300 ft, *E-5216.* Weed in wheat fields.

Calamagrostis longiaristata (Wedd.) Hack. in Sodiro, Anal. Univ. Quito 1889: 8. 1889.
AZUAY: Eastern cordillera, 4–6 km north of the village of Sevilla de Oro, 9000–10,000 ft, *E-4684.*

Calamagrostis macrophylla (Pilger) Pilger, Bot. Jahrb. 42: 60. 1908.
AZUAY–"ORIENTE" border: Eastern cordillera, between Oña and the Río Yacuambi, crest, 10,000–11,200 ft, edges of sphagnum swamps, *Prieto P-296.*

Agrostis alba L. Sp. Pl. 63. 1753; ed. 2. 1: 93. 1762.
PICHINCHA: Waste places in city of Quito, *E-1749.*

Agrostis breviculmis Hitchc. U. S. Dep. Agr. Bur. Pl. Ind. Bull. 68: 36. *pl. 18. 1905.*
AZUAY: Páramo de Tinajillas and surrounding chaparral and forests, 30–50 km south of Cuenca, 10,000–10,500 ft, *E-2112* (NY only). CHIMBORAZO-CAÑAR

border (western escarpment): Near El Tambo, 10,000–11,500 ft, *E-4083*. "Paja hembra"—a name usually applied to any of the smaller grasses.

Agrostis humboldtiana Steud. Nom. Bot. ed. 2. 1: 40. 1840.
AZUAY: Páramo de Tinajillas and surrounding chaparral and forests, 30–50 km south of Cuenca, 10,900 ft, *E-475*. Along the Río Cumbe (25–30 km. south of Cuenca), 9300–10,000 ft, *E-2207*. CAÑAR: Uplands called "Huairacaja," 10–20 km northeast of Azogues, 11,000 ft, *E-1775*.

Polypogon interruptus H.B.K. Nov. Gen. & Sp. 1: 134. *pl. 44.* 1816.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3164*.

Sporobolus poiretii (Roem. & Schult.) Hitchc. Bartonia 14: 32. 1932.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3098*.

Pereilema crinitum Presl, Rel. Haenk. 1: 233. *pl. 37, f. a.* 1830.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3073, E-3216*.

Muhlenbergia angustata (Presl) Kunth, Rév. Gram. 1: Suppl. XVI. 1830.
CAÑAR: Near the village of San Marcos (5–8 km northeast of Azogues), Parroquia Luis Cordero, "paja." Used primarily as thatching for mountain homes. *E-2519* (collected by Prieto).

Muhlenbergia ciliata (H.B.K.) Kunth, Rév. Gram. 1: 63. 1829.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-2951*.

Muhlenbergia microsperma (DC.) Kunth, Rév. Gram. 1: 64. 1829.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft. (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3052*.

Stipa brachyphylla Hitchc. Contr. U. S. Nat. Herb. 24: 275. 1925.
AZUAY: Along the Río Cumbe (25–30 km south of Cuenca), 9300–10,000 ft, *E-2208* (NY only).

Stipa ichu (Ruiz & Pav.) Kunth, Rév. Gram. 1: 60. 1829.
AZUAY: Along the Río Cumbe (25–30 km south of Cuenca), 9300–10,000 ft, *E-2213A, E-2213B*. This is the grass which is used so much as thatching for the mountain houses. It is also brought into the Cuenca market in great abundance, where it is sold to be mixed with adobe for walls and sun-dried bricks used in house and wall construction. The common name is "Paja de Cerro." Giler notes that when a woman is in the fields or on a journey and has difficulty in giving birth (the expression he used was "Cuando no pueden dar a luz"), she boils some of this grass and drinks the hot "tea," thus expediting parturition. *Camp E-2213B* shows the manner of harvesting this grass. It is not pulled out by the roots, but cut near the ground, permitting the same clumps to be harvested indefinitely. AZUAY: Along the Río Tarqui, 4–18 km south of Cuenca, 8300–9000 ft (near Baños), *E-1856*.

Stipa mucronata H.B.K. Nov. Gen. & Sp. 1: 125. 1816.
CHIMBORAZO: Cañon of the Río Chanchan, about 5 km north of Huigra, 5000–6500 ft (moist forested valleys in the afternoon fogbelt), *E-3324;* near Huigra, 4000–4500 ft, *E-3169*.

Aristida adscensionis L. Sp. Pl. 82. 1753.

CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3246*.

Aristida laxa Cav. Ic. Pl. 5: 44. *pl. 470. f. 1.* 1799.

AZUAY: Valley of the Río Paute, between Paute and Cuenca, 7200–8000 ft (dry cliffs, rocky hillsides and occasional ravines), *E-2314*.

Anthoxanthum odoratum L. Sp. Pl. 28. 1753.

AZUAY: Along the Río Cumbe (25–30 km south of Cuenca), 9300–10,000 ft, *E-2205*. CAÑAR: Uplands called "Huairacaja," 10–20 km northeast of Azogues, 10,000–11,000 ft, *E-1795*.

Phalaris angusta Nees ex Trin. Gram. Ic. 1: *pl. 78.* 1827.

AZUAY: Quebradas leading into the Río Collay, 3–8 km north of Sevilla de Oro, 7000–8300 ft, *E-5218*. New to Ecuador.

Pharus latifolius L. Syst. Nat. ed. 10. 2: 1269. 1759.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, opposite Chupiantza, ca. 2° 40′ S, 78° W, 2000–2300 ft, *E-1040* (NY only).

Pariana simulans Tutin, Jour. Linn. Soc. Bot. 50: 357. *pl. 10. f. 22.* 1936.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, benches and slopes, western side of Cutucú, ca. 2° 40′ S, 78° W, 2000–2500 ft, *E-1067* (NY only).

This species is new to Ecuador. Previously, it was known only from Panama (*H. Pittier 4075*, type), and Colombia.

Olyra cordifolia H.B.K. Nov. Gen. & Sp. 1: 198. 1816.

Junction of GUAYAS, CAÑAR, CHIMBORAZO and BOLIVAR: Foothills of the western cordillera near the village of Bucay, 1000–1250 ft, *E-3644*.

Olyra latifolia L. Syst. Nat. ed. 10. 2: 1261. 1759.

SANTIAGO-ZAMORA ("Oriente"): Valley of the Río Upano, from the Río Paute north ca. 17 km to the Chupiangas, uplands above the Upano, 1950–2200 ft, *E-1438;* low hills west of Río Upano, along Río Chupiangas, 2500–3200 ft, *Prieto ChuP-12*. Plant coarse, stem hollow.

Digitaria aequatoriensis (Hitchc.) Henr. Med. Rijks Herb. Leiden 61: 5. 1930.

CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3050*.

Digitaria sanguinalis (L.) Scop. Fl. Carn. ed. 2. 1: 52. 1772.

Junction of GUAYAS, CAÑAR, CHIMBORAZO and BOLIVAR: Foothills of the western cordillera near the village of Bucay, 1000–1250 ft, *E-3818*.

Pseudechinolaena polystachya (H.B.K.) Stapf in Prain, Fl. Trop. Afr. 9: 495. 1919.

SANTIAGO-ZAMORA ("Oriente"): Valley of the Río Upano, from the Río Paute north ca. 17 km to the Chupiangas, uplands above the Upano, 1950–2200 ft, *E-1436*.

Eriochloa weberbaueri Mez, Bot. Jahrb. 56. (Beibl. 125): 11. 1921.

AZUAY: Between Ríos Azogues and Gualaceo, valley of the Rio Paute, between Paute and Cuenca, 7200–8000 ft (dry cliffs, rocky hillsides and occasional ravines), *E-2346*.

This is the first collection of this species in Ecuador. The type was collected by Weberbauer in 1904 in Santa Cruz, Dept. Cajamarca, Peru (no. 4135).

Axonopus compressus (Swartz) Beauv. Ess. Agrost. 12, 154. 1812.

SANTIAGO-ZAMORA ("Oriente"): Near Mendez, 1750-2500 ft, *E-906;* eastern slope of the cordillera (on the trail from Sevilla de Oro to Mendez), valleys and cliffsides of small streams entering Río Paute, 2-3 km west of Mendez, 1900 ft, *E-1467* (NY only).

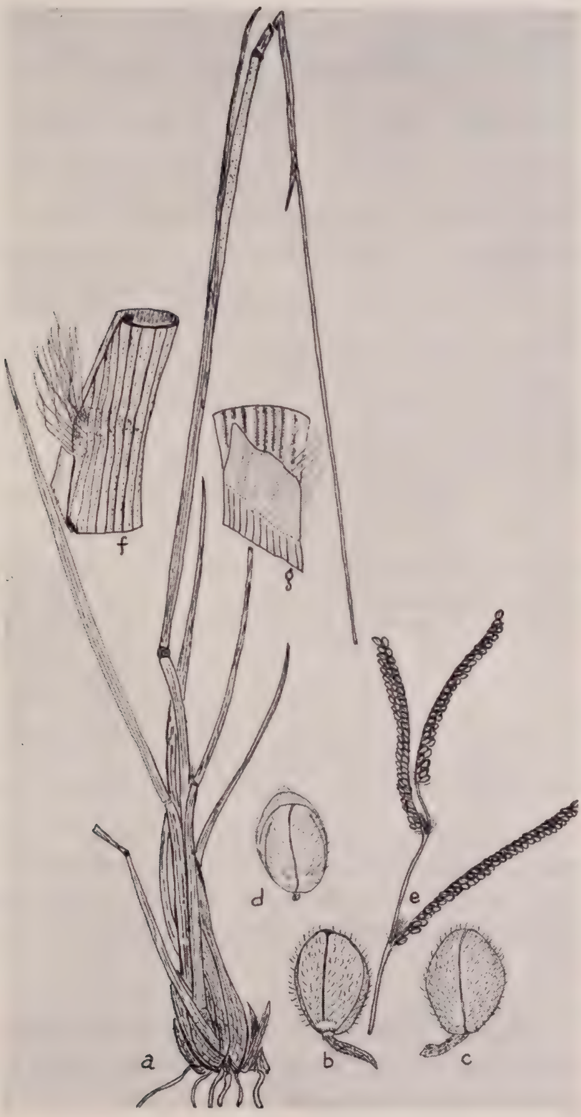

FIG. 1. *Paspalum azuayense* Sohns. *a,* plant × ½; *b,* spikelet, sterile lemma side; *c,* view of the second glume; *d,* mature spikelet, all × 10; *e,* inflorescence × 1; *f,* junction of sheath and blade, external view × 10; *g,* one half of ligule, inside view × 10. (Type.)

Paspalum azuayense Sohns, sp. nov.

Perenne, caespitosum; culmi 25–65 cm alti, striati, glabri; vaginae glaberrimae, marginibus ciliatae summo papilloso-ciliatae; ligula membranacea, brevis (1–1.5 mm longa); laminae 2–12 cm longae, acuminatae, 4–6 mm latae, supra sparse pilosae, subtus glaberrimae; racemi 2–4, 2.4–5 cm longi; rachis glabra, 0.9–1 mm lata, recta vel subflexuosa; spiculae binae, 1.6–2.1 mm longae, 1.2–1.5 mm latae, elliptico-ovatae; gluma secunda et lemma sterile minute pubescentia, 3-nervia, ad maturitatem gluma secunda quam lemmate fertili breviore; lemma sterile et lemma fertile aequalia; fructus ca. 2 mm longus, pallidus.

An erect tufted perennial; culms simple, 25–65 cm tall, striate, smooth; nodes 1–1.5 mm long, brown, glabrous; sheaths shorter than the internodes, prominently striate, glabrous, ciliate on the margins, papillose-pilose near the summit (especially on the innovations), the basal sheaths sparsely long pilose, becoming glabrescent, the uppermost bladeless; ligule membranaceous, 1–1.5 mm long; blades 2–12 cm long, folded when dry, 4–6 mm wide, glabrous on the lower surface, glaucous and sparsely pilose on the upper surface, the margins antrorsely scabrous; panicle (in mature specimens) long-exserted, 5–7 cm long; racemes 2–4, 2.4–5 cm long, straight or slightly flexuous, with a tuft of white hairs in the axils; rachis 0.9–1 mm wide, straight or nearly so, drying dark brown; spikelets in pairs, crowded, on short pedicels, greenish, brownish or drying dark-brown to reddish, elliptic-ovate, 1.6–2.1 mm long, 1.2–1.5 mm wide; second glume pubescent, three-nerved, shorter than the fertile lemma in mature spikelets; sterile lemma pubescent, as long as the fertile lemma; fruit pale, 2 mm. long, the lemma and palea minutely striate. (See Fig. 1, a-g.)

AZUAY: Between Ríos Azogues and Gualaceo, valley of the Río Paute, between Paute and Cuenca, 7200–8000 ft (dry cliffs, rocky hillsides and occasional ravines), April 26, 1945, *E-2313* (TYPE, US 2,011, 130).

Paspalum ceresia (Kuntze) Chase in Niles, Contr. U. S. Nat. Herb. 24: 153. 1925.

AZUAY: Between Ríos Azogues and Gualaceo, valley of the Río Paute, between Paute and Cuenca, 7200–8000 ft (dry cliffs, rocky hillsides and occasional ravines), *E-2332*.

Paspalum conjugatum Berg. Act. Helv. Phys. Math. 7: 129. *pl.* 8. 1762.

CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft. (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3095*. SANTIAGO-ZAMORA ("Oriente"): Near Mendez, 1750–2500 ft, *E-861*.

Paspalum humboldtianum Flügge, Monogr. Pasp. 67. 1810.

AZUAY: Vicinity of Cuenca, along Río Milchichic, about 5 km north of Cuenca, 8200–8900 ft, *E-2743* (collected by Prieto). CHIMBORAZO: Cañon of the Río Chanchan, about 5 km north of Huigra, 5000–6500 ft (moist forested valleys in the afternoon fogbelt), *E-3257*.

Paspalum notatum Flügge, Mongr. Pasp. 106. 1810.

CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3061*.

Paspalum pallidum H.B.K. Nov. Gen. & Sp. 1: 88. 1815.

CAÑAR: Dry chaparral scrub and páramo, with occasional moist valleys, near El Tambo (ca. 69 km by RR south of Sibambe), 9500–10,000 ft, *E-2929* (collected by Giler & Prieto).

Paspalum paniculatum L. Syst. Nat. ed. 10. 2: 855. 1759.

CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-2997*, *E-3067;* open deforested slope with small patches of scrub in the draws, directly above the village of Huigra, 5000–7000 ft, *E-3471.* SANTIAGO-ZAMORA ("Oriente"): Near Mendez, 1750–2500 ft, *E-860, E-907.*

Paspalum penicillatum Hook. f. Trans. Linn. Soc. **20**: 171. 1847.
CAÑAR: Dry chaparral scrub and páramo, with occasional moist valleys, near El Tambo (ca. 69 km by RR south of Sibambe), 9500–10,000 ft, *E-2910* (pro parte; collected by Giler & Prieto).

Paspalum prostratum Scribn. & Merr. U. S. Dep. Agr. Div. Agrost. Bull. 24: 9. 1901.
CAÑAR: In cultivated fields along Río Milchichic, about 5 km north of Cuenca, 8200–8900 ft, *E-2724* (collected by Prieto), "Achin"; dry chaparral scrub and páramo, with occasional moist valleys, near El Tambo (ca. 69 km by RR south of Sibambe), 9500–10,000 ft, *E-2910* (pro parte; collected by Giler & Prieto).

Paspalum racemosum Lam. Tabl. Encyc. **1**: 176. 1791.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-2968.*

Paspalum scabrum Scribn. U. S. Dep. Agr. Div. Agrost. Bull. 4: 36. *pl. 3.* 1897.
AZUAY: Quebradas leading into the Río Collay, 3–8 km north of Sevilla de Oro, 7000–8300 ft, *E-5217.* CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3212.* In areas under shrubs, scrambling by means of minute reflexed barbs on sheaths and blades to height of 2.5 m.

Paspalum sodiroanum Hack. Oesterr. Bot. Zeitschr. 51: 237. 1901.
PICHINCHA (western slope of the cordillera): Cerro Corazón, on steep bank, *E-1651* (NY only).

Panicum maximum Jacq. Coll. Bot. **1**: 76. 1786.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3165.*

Panicum polygonatum Schrad. in Schult. Mant. **2**: 256. 1824.
SANTIAGO-ZAMORA ("Oriente"): Near Mendez, 1750–2500 ft, *E-865.*

Panicum pulchellum Raddi, Agrost. Bras. 42. 1823.
Junction of GUAYAS, CAÑAR, CHIMBORAZO, and BOLIVAR: Foothills of the western cordillera near the village of Bucay, 1000–1250 ft, *E-3819.*

Panicum trichoides Swartz, Prodr. Veg. Ind. Occ. 24. 1788.
SANTIAGO-ZAMORA ("Oriente"): Lower plain of Río Upano, near Chupiantza, 1750–2500 ft, *E-1021.*

Ichnanthus nemorosus (Swartz) Doell in Mart. Fl. Bras. **2^2**: 289. 1877.
SANTIAGO-ZAMORA ("Oriente"): Ridge ascending into central Cutucú, 4200 ft, ca. 2° 40′ S, 78° W, *E-1113.*

This is a new record for the species in Ecuador.

Lasiacis scabrior Hitchc. Proc. Biol. Soc. Wash. 40: 85. 1927.
SANTIAGO-ZAMORA ("Oriente"): Ridge ascending into central Cutucú, Cordillera Cutucú, ca. 2° 40′ S, 78° W, 2800 ft, *E-1119* (collected by H. Jorgenson).

Lasiacis sorghoidea (Desv.) Hitchc. & Chase, Contr. U. S. Nat. Herb. **18**: 338. 1917.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3039.* SANTIAGO-ZAMORA ("Oriente"): Near Mendez, 1750–2500 ft, *E-911.*

Isachne arundinacea (Swartz) Griseb. Fl. Brit. W. Ind. 553. 1864.
Junction of GUAYAS, CAÑAR, CHIMBORAZO and BOLIVAR: Foothills of the western cordillera near the village of Bucay, 1000–1250 ft, *E-3718.*

Oplismenus burmanni (Retz.) Beauv. Ess. Agrost. 54, 168, 169. 1812.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-2967.*

Oplismenus hirtellus (L.) Beauv. Ess. Agrost. 54, 168, 170. 1812.
SANTIAGO-ZAMORA ("Oriente"): Near Mendez, 1750–2500 ft, *E-908.*

Oplismenus rariflorus Presl, Rel. Haenk. 1: 320. 1830.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3176.*

Setaria geniculata (Lam.) Beauv. Ess. Agrost. 51, 169, 178. 1812.
AZUAY: Between Ríos Azogues and Gualaceo, valley of the Río Paute, between Paute and Cuenca, 7200–8000 ft (dry cliffs, rocky hillsides and occasional ravines), *E-2299;* quebradas leading into the Río Collay, 3–8 km north of Sevilla de Oro, 7000–8300 ft, *E-5215.* CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3100.*

Setaria scandens Schrad. ex Schult. Mant. 2: 279. 1824.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-2952.* New to Ecuador.

Pennisetum peruvianum Trin. Linnaea 10: 295. 1836.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3103.* NAPO-PASTAZA ("Oriente"): Valley of the Río Pastaza and adjacent uplands, between Baños and Mera, 3500–5000 ft, *E-2394.*

Pennisetum purpureum Schum. Beskr. Guin. Pl. 64. 1827.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3062A, 3062B.*

Pennisetum setosum (Swartz) L. Rich. in Pers. Syn. Pl. 1: 72. 1805.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3188.*

Pennisetum tristachyum (H.B.K.) Spreng. Syst. Veg. 1: 302. 1825.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3096.*

Cenchrus echinatus L. Sp. Pl. 1050. 1753.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3083.*

Cenchrus myosuroides H.B.K. Nov. Gen. & Sp. 1: 115. *pl. 35.* 1815.
AZUAY: Between Ríos Azogues and Gualaceo, valley of the Río Paute, between Paute and Cuenca, 7200–8000 ft (dry cliffs, rocky hillsides and occasional ravines). In small tufts. "Paja rabo de Zorro." *E-2347.*

Arundinella berteroniana (Schult.) Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 290. 1917.
SANTIAGO-ZAMORA ("Oriente"): Lower plain of Río Upano, near Chupiantza, 1750–2500 ft, *E-1013;* eastern slope of the cordillera, valley of the Ríos Negro

and Chupianza (on the trail from Sevilla de Oro to Mendez), 2–3 km west of Mendez, 1900 ft, *E-1472*.

Heteropogon contortus (L.) Beauv. ex Roem. & Schult. Syst. Veg. 2: 836. 1817.
AZUAY: Above the Río Leon at 6500 ft on very dry bank, *E-277*. CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3207*.

Heteropogon melanocarpus (Ell.) Benth. Jour. Linn. Soc. Bot. 19: 71. 1881.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3206*.

Andropogon altus Hitchc. Contr. U. S. Nat. Herb. 17: 208. 1913.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3099*.

Andropogon barbinodis Lag. Gen. & Sp. Nov. 3. 1816.
CAÑAR: Near the village of San Marcos (5–8 km northeast of Azogues), Parroquia Luis Cordero, *E-2507* (collected by Prieto). "This grass [is] not much eaten by the animals because it is sharp-flavored like red pepper."

Andropogon bicornis L. Sp. Pl. 1046. 1753.
SANTIAGO-ZAMORA ("Oriente"): Above Río Upano, near junction with Río Paute, near Mendez, 1750–2500 ft, *E-967*.

Andropogon cirratus Hack. Flora 68: 119. 1885.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3031*.

Andropogon condensatus var. **paniculatus** (Kunth) Hack. in DC. Monogr. Phan. 6: 388. 1889.
AZUAY: Quebradas leading into the Río Collay, 3–8 km north of Sevilla de Oro, 7000–8300 ft, in dense clumps on open slope, *E-4997*. LEÓN: Area north of Latacunga, 11,000 ft, common in páramo, *E-2361*.

Andropogon condylotrichus Hochst. ex Steud. Syn. Pl. Glum. 1: 377. 1854.
CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3247*. New to Ecuador.

Andropogon hirtiflorus (Nees) Kunth, Rév. Gram. 1: Suppl. XXXIX. 1830.
AZUAY: Valley of the Río Paute, between Paute and Cuenca, 7200–8000 ft (dry cliffs, rocky hillsides, and occasional ravines), *E-1789*, *E-2298*. CAÑAR: Near the village of San Marcos, (5–8 km northeast of Azogues), Parroquia Luis Cordero, *E-2518* (collected by Prieto). Good forage and frequent in drier pastures.

Andropogon campii Swallen, sp. nov.

Perennis; culmi erecti, 65–80 cm alti, nodis dense barbatis; vaginae carinatae, collo longe et dense pilosae; laminae usque ad 22 cm longae, 5–9 mm latae, attenuatae, glabrae vel sparse pilosae; panicula 8–12 cm longa, ramis solitariis, basi nudis, 1–3 racemis 2–5 cm longis; spicula sessilis 5 mm longa; gluma prima marginibus sparse pilosa, apice scabra paulo carinata; lemma fertile angustum, aristatum, arista terminali 15–18 mm longa, geniculata, infra geniculam contorta; spicula pedicellata spiculam sessilem aequans, exaristata.

Perennial; culms erect, 65–80 cm high, glabrous, the nodes densely bearded with ascending hairs, a ring of glands below the nodes; sheaths longer than the internodes, somewhat keeled, glabrous to sparsely pilose, the collar usually densely bearded with long spreading hairs; ligule membranaceous, about 2 mm long; blades of the midculm as much as 22 cm long, 5–9 mm wide, flat, attenuate, narrowed toward the base, glabrous or sparsely pilose, especially toward the base, the margins scabrous; panicle 8–12 cm long, somewhat nodding, the axis glabrous, glandular-spotted, the branches somewhat distant, bearing 1–3 racemes, the lower borne 0.5–2 cm from the base; racemes 2–5 cm long, spreading; rachis joints and sterile pedicels densely ciliate on both sides, the hairs short toward the base, lengthening upward to as much as 4 mm long, almost equaling the spikelets; sessile spikelet 5 mm long, the first glume glabrous on the back, sparsely pilose below toward the margins, scabrous at the tip, the margins rounded, or keeled only near the summit; fertile lemma narrow, bearing a terminal awn 15–18 mm long, geniculate, tightly twisted below the bend; pedicellate spikelets conspicuous, as large as the sessile spikelet, awnless; first glume of both sessile and pedicellate spikelets with one or two glands about ¼ from the tip.

CHIMBORAZO: Cañon of the Río Chanchan, 5000–7000 ft, on open deforested slope with small patches of scrub in the draws, directly above the village of Huigra, May 29–31, 1945, *W. H. Camp E-3470* (TYPE, US 2,011,207); same locality, *Camp E-3478*. The latter specimen has a denser panicle with more numerous racemes than the type, often four on each branch, and the lower internodes are appressed-pilose.

This species resembles and is closely related to *Andropogon hirtifolius* Presl, rather common in southern Mexico, which differs in having fewer and coarser racemes, solitary on each branch, larger spikelets 6–7 mm long, and rachis joints and sterile pedicels rather evenly ciliate, the hairs on the upper part only slightly longer than the rest.

Andropogon scabriglumis Swallen, sp. nov.

Perennis; culmi erecti, graciles, 70–80 cm alti, glabri; vaginae carinatae, glabrae; laminae 18–20 cm longae, 4–5 mm latae, attenuatae, marginibus scabris; racemi bini, 3–5 cm longi; spicula sessilis 6 mm. longa; gluma prima acuta, scabra, apice carinata; lemma fertile bifidum, arista 15–18 mm longa, geniculata, infra geniculam contorta; spicula pedicellata 7 mm longa, acuminata, exaristata.

Perennial, in small clumps; culms slender, erect, 70–80 cm high, sparingly branched, glabrous; sheaths keeled, glabrous, the lower ones much longer, the upper ones somewhat shorter than the internodes; ligule inconspicuous, about 1 mm long; blades of the midculm 18–20 cm long, 4–5 mm wide, attenuate, scabrous on the margins, otherwise glabrous; racemes ascending, 3–5 cm long, in pairs, the pairs terminal on the main culm and branches, one sessile, the other with a peduncle 6–8 mm long; sessile spikelet 6 mm long, the first glume acute, light brown, conspicuously scabrous especially toward the tip, keeled toward the summit; fertile lemma deeply bifid, the lobes acuminate, awned from between the lobes, the awn 15–18 mm long, geniculate, tightly twisted below the bend; pedicellate spikelet 7 mm long, acuminate or awn-tipped.

CHIMBORAZO: Cañon of the Río Chanchan, 5000–7000 ft, on open deforested slope with small patches of scrub in the draws, directly above the village of Huigra, May 29–31, 1945, *W. H. Camp E-3472* (TYPE, US 2,011,209). TUNGUARAHUA: Baños, on rocky hill, 1800 m, *A. S. Hitchcock 21919.*

By Hitchcock in *The grasses of Ecuador, Peru, and Bolivia* (Contr. U. S. Nat. Herb. 24: 499. 1927) this species was referred to *Andropogon lateralis* var. *incanus* (Hack.) Henr. In that species and variety, however, the sessile spikelet is much smaller and narrower than the pedicellate spikelet, the first glume of the sessile spikelet is glabrous and depressed between the keels, and the hairs on the rachis joints and sterile pedicels are much longer and more conspicuous.

Hackelochloa granularis (L.) Kuntze, Rév. Gen. Pl. 2: 776. 1891.

CHIMBORAZO: Cañon of the Río Chanchan near Huigra, 4000–4500 ft (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-2948*.

Coix lachryma-jobi L. Sp. Pl. 972. 1753.

SANTIAGO-ZAMORA ("Oriente"): Near Mendez, 1750–2500 ft, *E-947*. "Trigo Tropical." Propagated by the padres of the Sileciano mission at Mendez, and said to have been brought in (five seeds) from their mission in Colombia two years ago. Leaves somewhat narrower than the wild sort, the most notable and obvious difference being the ribbing on the indurated sheath (fruit covering) and more yellow color at maturity. Physically, this sheath is much thinner than in the wild sort, so that it can be easily cracked between the fingers. This permits it to be milled more easily than the wild sort. The flour is said to be a little heavy and needs to be mixed with wheat flour before it can be used for bread. It is said to be of excellent flavor and to have possibilities as a tropical substitute for barley and other such grains. Horticulturally, it is a better plant than the wild one, for it seems to be more fruitful and also to have the inflorescences lifted above the leaves a little more. At present, the crop is curtailed by the invasion of rodents just at harvest time as grains mature. The padres have found it necessary to eradicate the wild material since the two hybridize. Same locality: "wild type," propagated for rosary beads, *E-948*.

U. S. National Museum
Washington, D. C.

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PLANTS COLLECTED IN ECUADOR BY W. H. CAMP

PIPERACEAE

T. G. YUNCKER

At the time that Casimir de Candolle monographed the Piperaceae for the de Candolle *Prodromus* in 1869,[1] little was known of the Ecuadorean flora and scarcely more than two dozen species of the Piperaceae from that country are included in the work. During the nineteenth century, especially its latter half, notable collections were made by Jameson, Couthouy, Hartweg, Spruce, André, Eggers, Sodiro, and others. More recently a number of collectors from the United States have been going into areas hitherto less known and have brought to light many new and interesting species. The specimens reported in the present paper were collected by Wendell H. Camp in southeastern Ecuador during the years 1944 and 1945.

After the *Prodromus* monograph, de Candolle published a number of papers on the family as represented in Ecuador. Among the more important was one published in 1898[2] and based on collections made by Sodiro. Another was published posthumously in 1920[3] on collections made by Sodiro, Jameson, and Eggers. Sodiro, who lived in Ecuador and who was a student of its flora, monographed the family for the country in 1900.[4] Trelease and Yuncker in 1950[5] presented all the known species in a monographic report covering northern South America. The present paper adds a number of novelties to those formerly known and emphasizes the fact that the flora of Ecuador is still imperfectly known.

The great range in elevation from sea level to more than 6000 m, and the effect on rainfall and temperature of the great cordilleras produce a diversity of ecological conditions in Ecuador scarcely equaled by any other area of similar size. In the moist valleys and on mountain slopes up to 3000 m occur ideal conditions for the growth and development of members of the Piperaceae. Continued exploration, especially in the southern and eastern regions, will undoubtedly bring to light many species as yet unknown.

PIPER L.

A—Ovary and Fruit Stylose

Piper calceolarium C.DC. var. **magnifolium** (C.DC.) Trel. & Yun. Pip. North. S. Am. 15. *f. 3.* 1950.

AZUAY: Nudo de Portete, pass between headwaters of the Ríos Tarqui (Atlantic) and Giron (Pacific), about 2700 m, March 10, 1945, *E-2184*;[6] the eastern cordillera, 1–8 km north of the village of Sevilla de Oro, 2400–2700 m, July 27–Aug 12, 1945, *E-4354, E-4399.*

LOJA: Cerro Villanaco, about 7 km west of the city of Loja, 2400–2850 m, Oct 9, 1944, *E-664.*

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[1] DC. Prodr. 16(2). 1869.

[2] Bull. Herb. Boiss. 6(6). 1898.

[3] Ann. Cons. Jard. Bot. Genève 21: 251–270. 1920.

[4] R. P. L. Sodiro, Contr. Conoc. Fl. Ecuator. 1900.

[5] Pip. North. S. Am. 1950.

[6] Where no collector is specified, the name of *W. H. Camp* should be understood.

Piper lacunosum H.B.K. var. **glabricaule** Trel. & Yun. Pip. North. S. Am. 21. 1950.

AZUAY: the eastern Cordillera, 1–8 km north of the village of Sevilla de Oro, 2400–2700 m, July 27–Aug 12, 1945, *E-4405, E-4658, E-5279.*

Piper pterocladum C.DC. Candollea 1: 145. 1923.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, ridge ascending into central Cutucú, 1260 m, Nov 17–Dec 5, 1944, *E-1112;* 1410–1470 m, *E-1161.*

These specimens show certain differences, mostly in size, from those previously known of this species, but it is believed that these differences may be due to the stage of development or to environmental conditions. The collector reports the stem as fluted and the spikes as pendent. The pubescence is very minute; the leaves up to 15 cm wide × 31 cm long, with 8–12 nerves on each side; and spikes 8–10 mm thick × 10–12 cm long with a stout peduncle about 1 cm long.

Piper cutucuense Yuncker, sp. nov.

Frutex; foliis late ellipticis, apice brevi-acuminatis, basi rotundatis truncatis vel late cordatis, supra glabratis, venis subtus puberulis, a parte infera pinnatim venosis; petiolo fere ad laminam vaginato; bracteis calceolato-apiculatis; ovario ovoideo, stylo sat longo sub-subulato.

Shrub 1.5–3 m tall; upper internodes slender, about 5–7 cm long, minutely retrorse-hirtellous; leaves broadly elliptic, 11–14 cm wide × 17–22 cm long, the apex short-acuminate, the base rounded, truncate or shallowly cordate, one side 2–5 mm shorter, abruptly acute at the petiole, glabrous and dark green above, paler beneath with puberulent nerves, not ciliate, obscurely glandular-dotted, pinnately nerved from the lower half, the nerves 5 or faintly 6 on each side, with cross-connecting-anastomosing nervules, drying papery, translucent; petiole 2–2.5 cm long, vaginate to near the blade, densely retrorse-hirtellous; spikes 5–8 mm thick × 1–2.5 cm long, apiculate; peduncle scarcely 1 cm long, retrorse-hirtellous; bracts calceolate-apiculate, densely pilose downward; ovary ovoid with a rather long, sub-subulate style; stigmas ligulate; fruit not developed.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, ridge ascending into central Cutucú, 1260 m, Nov 17–Dec 5, 1944, *E-1402* (TYPE).

Piper schultesii Yuncker in Trel. & Yun. Pip. North. S. Am. 34. *f. 26.* 1950.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, ridge ascending into central Cutucú, 900–1500 m, Nov 17–Dec 5, 1944, *Camp s. n.*

The type of this species was collected in the province of Vaupés, Colombia.

Piper heterocarpum Trel. var. **subglabricaule** Yuncker, var. nov.

Internodiis superis e modice ad dissite longe-villosis; petiolo 1 cm longo; drupa apice depressa.

Upper internodes slender, 3–5 cm long, glandular-dotted, moderately to sparsely long-villous, the hairs up to 2 mm long; base of the blade inequilateral with one side 5 mm shorter and subobtuse or acute, pinnately nerved from the lower half, the nerves about 5 on each side, with numerous intermediates, the uppermost pair extending to the apex and cross-connected with the midrib; petiole about 10 plus 5 mm long; fruit obypramidal-subtrigonous with a depressed apex and short, stout style.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, ridge just south and west of Río Itzintza, 1350–1650 m, Nov 17–Dec 5, 1944, *E-1313* (TYPE).

This variety differs from the Peruvian species in its scarcely villous glabrescent internodes, leaves with acute or obtusish base, numerous intermediate nerves, and longer petiole. It also resembles both *P. brownsbergense* and *P. setosum*. From the former it differs because of its larger and more acuminate leaves, longer pubescence, and basally vaginate petioles. From the latter it differs because of its shorter peduncles, non-ligulate bracts, and rounded rather than linear stigmas.

Piper crassinervium H.B.K. Nov. Gen. & Sp. 1: 48. 1815.

Junction of the provinces of GUAYAS, CAÑAR, CHIMBORAZO & BOLIVAR: foothills of the western cordillera, near the village of Bucay, 300–375 m, June 8–15, *E-3830*.

SANTIAGO-ZAMORA ("Oriente"): valley of the Río Zamora, east of Loja, near Zamora, about 900 m, June 28–July 1, 1944, *E-14*; uplands along Río Upano just north of junction with Río Chupiantza, near Mendez, 515–750 m, Nov 14, 1944, *E-992*; upland benches along the Río Paute, near Mendez, 525–750 m, Dec 12, 1944, *E-1452*; valleys and cliff-sides of small streams entering Río Paute, near Mendez, 525–750 m, Dec 13, 1944, *E-1459*; from Mendez to crossing of Río Paute, 570–630 m, Dec 14, 1944, *E-1508*.

Piper brachipilum Yuncker, sp. nov.

Frutex; foliis elliptico-obovatis, apice acutis, basi subaequilateraliter acutis, supra glabris, subtus villosis, pilis arborescentibus, omnino pinnatim venosis; petiolo fere ad laminam vaginato; drupa globosa glabra; stigmatibus brevibus stylo subcrasso fultis.

Shrub, up to 3 m tall, the young branches rusty-villous; leaves elliptic-obovate, 15 cm wide × 30 cm long, the apex acute, the base subequilaterally acute, glabrous above, villous beneath, the nerves densely so, the hairs strongly branched arborescent, the margin rather densely ciliate, pinnately nerved throughout, the nerves about 12–14 on each side, submarginally loop-connected, drying firm, subopaque; petiole 3–4 cm long, villous, vaginate near the base; spikes 10 mm thick × 10–12 cm long; peduncle 1 cm or more (?) long, villous; bracts round-subpeltate, villous, with a prominent umbonate center; fruit globose, glabrous; stigmas short, on a moderately stout style.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, on a ridge ascending into Cutucú, 900 m, Nov 17–Dec 5, 1944, *E-1094* (TYPE).

The large leaves, pinnately nerved throughout, with conspicuously branched hairs on the lower surface, and the long-stylose fruits are distinctive characters of this species. The leaf shape and arborescent hairs distinguish it from *P. riotintasense* to which it bears a superficial resemblance.

Piper pseudo-curvatum Trel. Field Mus. Publ. Bot. 13(2): 216. 1936.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, opposite Chupiantaz, 600–690 m, Nov 17, 1944, *E-1048*.

This specimen agrees very well with the description of this Peruvian species.

Piper densiciliatum Yuncker, sp. nov.

Frutex; foliis oblongo-lanceolatis, apice obtuse acutis, basi cuneatis decurrentibus, glabris, glanduloso-punctatis, margine conferte ciliatis, omnino pinnatim venosis; drupa globosa glabra; stigmatibus ligularibus recurvis stylo subulato aequilongo fultis.

Shrub, 2 m tall; upper internodes slender, mostly 2–4 cm long, glabrous or very scantily and evanescently villous; leaves deep green and dull above, glaucous-pale beneath when living, oblong-lanceolate, 4–8 cm wide × 12–20 cm long, the apex bluntly pointed, the base cuneate-decurrent with one side narrowed downward and 2–5 mm shorter, glabrous except the densely ciliate margin, glandular-dotted, pinnately nerved throughout, the nerves 8–12 on each side, with intermediates and rather strong cross-connecting-anastomosing nervules, the ultimate nervules very numerous as seen by transmitted light, drying papery, sub-translucent; petiole 1–2 cm long, vaginate at the base, glabrous; spikes 10 mm thick × 10–12 cm long when mature, creamy-white at anthesis; peduncle 1–2 cm long, glabrous; bracts triangular-subpeltate, marginally densely fringed; fruit globose, glabrous, with a stout, subulate equilong style, green when living; stigmas ligulate, recurved.

AZUAY-"ORIENTE" border: eastern cordillera, between Oña and the Río Yacuambi, west slope, 2400–2850 m, Sept 10–19, 1945, *Prieto P-216* (TYPE).

This species most closely resembles *P. conejoense* and *P. phytolaccaefolium.* From the former it differs in its lack of pubescence, dense ciliation, type of nervation, and longer petioles; from the latter in the type of nervation, larger leaves, longer spikes, etc.

Piper azuaiense Yuncker, sp. nov.

Frutex; foliis ovato-lanceolatis, apice acuminatis, basi cuneatis, supra glabris, subtus e modice ad conferte crispe pubescentibus, omnino pinnatim venosis; drupa globosa glabra, stylo aequilongo, crasso, stigmatibus ligulatibus.

Coarse shrub, 3 m tall; young branches nodose; internodes rather stout, sparsely hirsute-glabrescent; leaves ovate-lanceolate, 9–15 cm wide × 25–35 cm long, the apex acuminate, the base cuneate-decurrent, one side about 5 mm shorter, deep green, subnitid, and glabrous above when growing, paler and moderately to densely crisp-pubescent beneath, ciliolate, pinnately nerved throughout, the nerves mostly 10–12 on each side, with intermediates and cross-connecting-anastomosing nervules, drying firm, opaque; petiole 2–3 cm long, glabrous, vaginate at the base; spikes 10 mm thick × 10–12 cm long; peduncle about 1.5 cm long, glabrous; bracts round-subpeltate, the margin densely yellow-fringed; fruit dark, globose, glabrous, the style subequilong, stout, subulate; stigmas ligulate, spreading.

AZUAY: the eastern cordillera, 1–8 km north of the village of Sevilla de Oro, 2400–2700 m, July 27–Aug 12, 1945, *E-4466* (TYPE).

This species appears to be closely related to *P. rio-tintasense.* It differs in its larger leaves which are glabrous above and more densely pubescent beneath, and especially in its densely fringed bracts.

Piper phytolaccaefolium Opiz in Presl, Rel. Haenk. 151. 1830.

CHIMBORAZO: cañon of the Río Chanchan near Huigra (mostly scrub-chaparral, with a few seepages and small swamps along the river), 1200–1350 m, May 7–14, 1945, *E-3078.*

Junction of GUAYAS, CAÑAR, CHIMBORAZO & BOLIVAR: foothills of the western cordillera near the village of Bucay, 300–375 m, June 8–15, 1945, *E-3652, E-3658.*

EL ORO: junction of Ríos Ambocas and Luis, 10 km due south of Portovelo, 600–750 m, Oct 6, 1944, *E-593.*

Piper stileferum Yuncker, sp. nov.

Frutex; foliis late ellipticis, apice breviter acute acuminatis, basi rotundatis truncatis vel latius cordatis, supra glabris, subtus ad venas puberulis, a parte infera pinnatim venosis; drupa globosa, glabra; stigmatibus recurvis stylo linearibus subulato fultis.

Shrub, 1.5–3 m tall; upper internodes 3–6 cm long, rather slender, reflexed-hirtellous; leaves broadly elliptic, 9–12 cm wide × 16–19 cm long, the apex sharply short-acuminate, the base rounded, truncate or shallowly lobed, abruptly acute at the petiole and one side 2–3 mm shorter, glabrous above, the nerves beneath puberulent, not ciliate, pinnately nerved from the lower half, the nerves 6 on each side, with rather prominent cross-connecting-anastomosing nervules as seen by transmitted light, drying membranous, translucent; petiole about 20 plus 2–3 mm long, vaginate to near the blade, recurved-hirtellous; spikes 8 mm thick ×

3 cm long; peduncle scarcely 5 mm long, reflexed-hirtellous; bracts slipper-shape, fringed along the inner edge; fruit globose, glabrous; stigmas recurved, on an elongate, subulate style.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, at junction of Ríos Itzintza and Chupiasa, 1050 m, Nov 17–Dec 5, 1944, *E-1400*; valleys and cliff-sides of small streams entering Río Paute, 2–3 km west of Mendez, 570 m, Dec 13, 1944, *E-1453* (TYPE).

Piper camiloi Yuncker var. **glabratum** Yuncker, var. nov.

Frutex 1.5 m altus, glaber.

SANTIAGO-ZAMORA ("Oriente"): uplands west of Río Upano, near Mendez, 525–750 m, Nov 13, 1944, *E-975* (TYPE); Cordillera Cutucú ca 2° 40' S, 78° W, opposite Chupiantza, 600–690 m, Nov 17, 1944, *E-1031*. The leaves on the latter specimen are about 2 cm wide × 7–8 long.

Piper mendezense Yuncker, sp. nov.

Frutex glaber; foliis lanceolatis vel oblongo-ellipticis, apice acute-acuminatis, basi aequilateralibus acutis decurrentibus, omnino pinnatim venosis; petiolo ad laminam vaginato-alato; ovario ovoideo substyloso; stigmatibus parvis.

Shrub 1.5 m tall, glabrous; upper internodes moderately slender, 3–6 cm long, gray-granular; leaves lance- or oblong-elliptic, the apex sharp-acuminate, the base equilateral, acute, decurrent, 3.5–5 cm wide × 10–13 long, gray-granular on both sides, pinnately nerved throughout, the nerves 6–8 on each side, with intermediates, the anastomosing nervules small, obscure, with numerous intra-aerole contorted branches, drying firm, opaque; petiole 8–20 mm long, the lower, longer ones vaginate-winged to the blade; spikes as yet young, 3 mm thick × 12 mm long, apiculate; peduncle 5 mm long; bracts triangular-subpeltate, marginally fringed; ovary ovoid, with pointed, substylose apex; stigmas ligulate; fruit not mature.

SANTIAGO-ZAMORA ("Oriente"): above Río Upano, near junction with Río Paute, near Mendez, 525–750 m, Nov 13, 1944, *E-961* (TYPE).

The glabrous branches and leaves, leaves pinnately nerved throughout with contorted intra-aerole nervules, and substylose ovaries are distinctive characters of this species.

Piper leticianum C.DC. var. **nanum** Yuncker, var. nov.

Frutex; foliis supra glabris, subtus longe villosis; stylo crasso; stigmatibus subligulatis brevibus.

Small shrub 1 m tall; leaves 2.5–4 cm wide × 10–12 cm long, glabrous above and long-villous beneath, at least along the nerves; stigmas short, subligulate, on a stout style.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, western side of Cutucú, 870–900 m, Nov 17–Dec 5, 1944, *E-1082* (TYPE).

From var. *tessmannii* of Peru, which is also glabrous on the upper leaf surface, it differs in its smaller leaves with acute rather than rounded bases.

Piper leticianum C.DC. var. **longispicum** Yuncker, var. nov.

Foliis supra glabris, subtus conferte villosis: stylo crasso.

Leaves glabrous above, densely villous beneath, 2.5–4 cm wide × 10–12 cm long, with 8–10 nerves on each side, with intermediates and cross-connecting nervules; spikes 5 cm long; fruit with a stout, obvious style.

LOJA: Loma de Oro, just south of Saraguro, as epiphyte, 3150 m, Oct 10, 1944, *E-697* (TYPE).

A—Ovary and Fruit not Stylose
B—Leaves not Peltate
C—Leaves Palmately Nerved

Piper medium Jacq. var. **ceanothifolium** (H.B.K) Trel. & Yun. Pip. North. S. Am. 69. 1950.

CHIMBORAZO: cañon of the Río Chanchan, from Naranjapata to below Huigra, 600–900 m, June 19, 1945, *E-3871.*

Piper reticulatum L. Sp. Pl. 29. 1753.

SANTIAGO-ZAMORA ("Oriente"): uplands along Río Upano just north of junction with

Piper marginatum Jacq. var. **anisatum** (H.B.K.)C.DC. in Urb. Symb. Ant. 3: 172. 1902.

CHIMBORAZO: cañon of the Río Chanchan, from Naranjapata to below Huigra, 600–900 m, June 19, 1945, *E-3880.*

GUAYAS: coastal plain, in the vicinity of Naranjito, about 36 m, June 6–7, 1945, *E-3547, E-3604.*

C—Leaves more or less Pinnately Nerved
D—Principal Branches of the Midrib arising from Below the Upper Third of the Blade

Piper lancilimbum Yuncker, sp. nov.

Frutex habitu arborescente glaber; foliis lanceolatis, apice sensim dissite falcatim longe acuminatis, basi subaequilateraliter acutis, a tertio vel quarto infero pinnatim venosis; petiolo ad laminam vaginato alato; ovaris congestis lateraliter complanatis.

Tree-like glabrous shrub, 1.5 m tall, the upper internodes mostly 3–6 cm long, drying longitudinally striate; leaves lanceolate, 3.5–6 cm wide × 18–23 cm long, gradually somewhat falcately long-acuminate, the base subequilaterally acute, pinnately nerved from the lowermost 3–4 cm, the nerves about 2 on each side, salient beneath, continuing to the apex, the inner pair strongly cross-connected with the midrib upward, finely venulose by transmitted light, drying chartaceous, translucent; petiole about 2 cm long, vaginate-winged to the blade; spikes as yet young, 2 mm thick × 4 cm long; peduncle about 1 cm long, slender; bracts triangular, subpeltate, marginally fringed; ovaries closely compacted, laterally flattened; stigmas slender; fruit not developed.

SANTIAGO-ZAMORA: low hills west of Río Upano, along Río Chupiangas, 750–960 m, Nov 20–22, 1944, *Prieto ChuP-8* (TYPE).

The lanceolate, glabrous leaves, low nervation, and small spikes are distinctive features of this species.

Piper diffundum Yuncker, sp. nov.

Frutex parvus subprostratus; foliis suboblique lanceolato-ellipticis, apice attenuatis longe-acuminatis, basi subaequilateraliter rotundatis cordulatis; supra dissite villosis glabrescentibus, subtus ad venas haud conferte villosis, a quarto infero pinnatim venosis; drupa globosa, griseo-porriginosa; stigmatibus sessilibus.

Small, low, sprawling shrub; stems slender, nodose; internodes mostly 4–6 cm long, glabrous, rather glossy; leaves subobliquely lance-elliptic, the apex attenuately long-acuminate, the base subequilaterally rounded, cordulate, one side about 2 mm shorter at the petiole, 2.5–4.5 cm wide × 10–14 cm long, sparsely villous above, glabrescent, loosely villous along the nerves beneath, not ciliate, pinnately nerved with 2–4 nerves from the lower one-fourth, or occasionally one somewhat higher, the midrib with shorter subordinate branches upward, finely venulose by transmitted light, drying thin, translucent; petiole scarcely 5 mm long, sparsely villous, vaginate at the base; spikes 2-3 mm thick × 1-1.5 cm long; peduncle slender, glabrous; bracts triangular-subpeltate, marginally fringed; fruit globose, gray-scurfy; stigmas linear, sessile.

SANTIAGO-ZAMORA ("Oriente"): above Río Upano, near junction with Paute, near Mendez, 625-750 m, Nov 13, 1944, *E-968* (TYPE).

The sprawling growth habit of the small plants, leaf shape, short petioles, spikes shorter than the peduncles, etc. are distinctive characters of this species. It most closely resembles *P. dichroostachyum*, from which it differs in several characters.

Piper ottoniaefolium C.DC. var. **latifolium** Trel. & Yun. Pip. North. S. Am. 87. 1950.

Junction of GUAYAS, CAÑAR, CHIMBORAZO & BOLIVAR: foothills of the western cordillera near the village of Bucay, 300-375 m, June 8-15, 1945, *E-3767*, *E-3828*.

Piper lenticellosum C.DC. Jour. Bot. 4: 167. 1866.

CHIMBORAZO: cañon of the Río Chanchan (open deforested slope with small patches of scrub in the draws, directly above the village of Huigra), 1500-2100 m, May 29-31, 1945, *E-3525*.

PICHINCHA (western slope of the cordillera): along the road from Quito to Sta. Domingo de los Colorados, 1600 m, Jan 15, 1945, *E-1740*.

Piper barbatum H. B.K. Nov. Gen. & Sp. 1: 55. 1815.

AZUAY: along the Río Matadero, west of Cuenca, 2500-2700 m, March 3, 1945, *E-1897;* vicinity of Cuenca, 2460-2670 m, April 16, 1945, *Prieto (Camp E-2712)*.

Piper bogotense C.DC. Jour. Bot. 4: 214. 1866.

AZUAY: the eastern cordillera, 1-8 km north of the village of Sevilla de Oro, 2400-2700 m, July 27-Aug 12, 1945, *E-4519*.

Piper marsupiatum Trel. & Yun. Pip. North. S. Am. 105. *f*. 78. 1950.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, junction of Ríos Itzintza and Chupiasa, 1050 m, Nov 17-Dec 5, 1944, *E-1404*.

Piper lunulibracteatum C.DC. var. **villirameum** Yuncker in Trel. & Yun. Pip. North. S. Am. 106. 1950.

AZUAY: the eastern cordillera, 1-8 km north of the village of Sevilla de Oro, 2400-2700, July 27-Aug 12, 1945, *E-4476;* Aug 12, 1945, *E-4657*.

These specimens agree reasonably well with the type of this variety though differing somewhat in size, degree of pubescence, etc.

Piper productispicum Yuncker, sp. nov.

Arbor; foliis elliptico-ovatis vel rhombico-ellipticis, apice obtuse acutis, basi oblique haud profunde cordatis, supra rugoso-bullatis glabris, subtus lacunosis conferte brunneo-villosis a tertio supero deorsum pinnatim venosis; petiolo ad laminam vaginato-alato; drupa subglobosa; stigmatibus sessilibus.

Tree, 5 m tall; upper internodes 5-10 cm or more long, sparingly warty, densely brown-pubescent; leaves elliptic-ovate or rhombic-elliptic, the apex bluntly acute, the base obliquely rounded, shallowly cordate with broad, open sinus, the upper surface rugose-bullate, glabrous, lacunose and densely brown-villous beneath, 16-18 cm wide × 24-30 cm long, pinnately nerved below the upper third, the nerves salient, mostly 6-8 on each side, with intermediates and cross-connecting-anastomosing nervules, drying firm, opaque; petiole 4-6 cm long, matted brown-pubescent, vaginate-winged to the blade; spikes 12 mm thick × 50 cm long, pendent when mature; peduncle 4 cm long, matted brown-pubescent;

bracts triangular-subpeltate, brown-hairy; fruit subglobose-compressed; stigmas linear, sessile.

CHIMBORAZO: cañon of the Río Chanchan, about 5 km north of Huigra (moist forested valleys in the afternoon fog-belt), 1500–1950 m, May 19–28, 1945, *E-3362* (TYPE).

The large, bullate, oblique-based leaves and long, thick spikes are distinctive features of this species.

Piper squamulosum C.DC. Bull. Herb. Boiss. 6: 488. 1898.

Junction of GUAYAS, CAÑAR, CHIMBORAZO & BOLIVAR: foothills of the western cordillera near the village of Bucay, 300–375 m, June 8–15, 1945, *E-3664, E-3747.*

EL ORO: in Moro-Moro region (about 21 miles west of Portovelo), in dense rain-forest, 1020–1260 m, Oct 7, 1944, *E-640.*

Piper obliquum R. & P. Fl. Peruv. & Chil. 1: 37. *pl. 63.* 1798.

SANTIAGO-ZAMORA ("Oriente"): valley of the Río Zamora, east of Loja, ridge across the river from the village of Zamora, 2400 m, June 28–July 1, 1944, *E-39;* Cordillera Cutucú, ca 2° 40' S, 78° W, ridge ascending into central Cutucú, 1260 m, Nov 17–Dec 5, 1944, *E-1116.*

Piper strigosum Trel, Field Mus. Publ. Bot. 13: 238. 1936.

SANTIAGO-ZAMORA ("Oriente"): eastern slopes of the cordillera, valley of the Río Negro, near junction of Ríos Pailas and Negro, on the trail to Mendez, 1800–2250 m, Aug 20–24, 1945, *Prieto (Camp E-4937).*

The collector reports the leaves as deep green above, very pale beneath, and with "ruffled" margins; petiole margin deep red to crimson, becoming reddish-green with age; floral bracts pink; spikes pendent.

This species was based on a specimen collected by Killip and Smith (no. 28538) at Balsapuerto, Loreto, Peru. The type lacks spikes. Those on the present specimen are as yet immature, 2 mm thick × 4 cm long; peduncle slender, 2 cm long, puberulent with a mixture of long hairs; bracts broadly triangular-subpeltate, puberulent; ovary ovoid, gradually pointed, substylose; stigmas linear, curved; fruit immature.

Piper subnitidifolium Yuncker, sp. nov.

Frutex; foliis oblongo-ellipticis, apice sensim acutis, basi inaequilateraliter cordatis, supra subnitidis ad venas conferte pubescentibus, subtus villosis, a parte infera pinnatim venosis; petiolo ad laminam vaginato-alato; ovario ovoideo; stigmatibus sessilibus.

Shrub, 2 m tall; upper internodes moderate, 6 cm or more long, moderately subhispid; leaves oblong-elliptic, the apex gradually acute, the base inequilaterally cordately lobed, the sinus open, one side 5 mm shorter at the petiole, subnitid above with the nerves densely pilose, paler and villous beneath, 14 cm wide × 22 cm long, pinnately nerved from the lower half, the nerves about 6 on each side, with cross-connecting-anastomosing nervules, the ultimate nervules very fine and numerous as seen by transmitted light, drying rather membranous, translucent; petiole about 15–25 plus 5 mm long, rather densely pilose, vaginate-winged to the blade; spikes as yet young, 3 mm thick × 2.5 cm or more long; peduncle 1.5 cm long, rather sparsely pilose; bracts triangular-subpeltate, fringed; ovary ovoid; stigmas sessile.

GUAYAS: coastal plain, in the vicinity of Naranjito, about 36 m, June 6–7, 1945, *E-3637* (TYPE).

Piper pendentispicum Trel. & Yun. Pip. North. S. Am. 157. *f. 136.* 1950.

SANTIAGO-ZAMORA ("Oriente"): eastern slopes of the cordillera, valley of the Río Negro, near junction of Ríos Pailas and Negro, on trail to Mendez, 1800–2250 m, Aug 20–24, 1945, *Prieto (Camp E-4946).*

The collector notes the plants as trees 10 or rarely 15 m tall with leaves deep green and having velvety sheen above and very pale beneath.

This specimen agrees very well with those previously known from the eastern cordillera of Colombia. The leaf apex is blunt, the peduncle up to 6 or 7 cm long, and the bracts are more triangular-subpeltate and more densely hairy. The branched pubescence on the lower leaf surface is a distinctive feature of this species.

Piper begoniiforme Yuncker, sp. nov.

Frutex; foliis ellipticis, apice sensim acutis, basi inaequilateraliter lobatis, sinu obliquo, supra glabris, subtus brunneo-villosis, a parte infera pinnatim venosis; petiolo ad laminam vaginato-alato; drupa obovoidea, glabrata; stigmatibus sessilibus.

Shrub, up to 5 m tall; stems strict; upper internodes moderate, 5–8 cm long, with scattered lenticels, sparsely villous glabrescent; leaves elliptic, the apex gradually acute, the base inequilateral, auriculately lobed, the sinus oblique, the larger lobe about 6–8 cm long, curved, covering the petiole, the smaller lobe about 5–10 mm shorter at the petiole, 12–20 cm wide × 22–28 cm long to the petiole, glabrous above, brown-villous beneath, the nerves densely so, pinnately nerved from the lower half, the nerves 5 on each side plus one or two shorter descending nerves in the larger lobe, with cross-connecting-anastomosing nervules, submarginally loop-connected, drying firm, opaque; petiole 4–7 cm long, glabrous, vaginate-winged to the blade; spikes 6–8 mm thick × 30 cm long when mature, pendent; peduncle 2.5 cm long, glabrous; bracts triangular-subpeltate with lateral wings which embrace the fruit, the pedicel crisp brown-pilose; fruit obovoid, glabrous; stigmas small, sessile.

CHIMBORAZO: cañon of the Río Chanchan, about 5 km north of Huigra, moist forested valleys in the afternoon fog-belt, 1500–1950 m, May 19–28, 1945, *E-3301* (TYPE).

This species resembles *P. pendentispicum* to some extent but differs in the simple hairs of the indument, fewer nerves, etc. It also superficially resembles *P. arbelaezii* from which it differs, however, in its glabrescent stems, fewer nerves, etc.

Piper verbascifolium (Miq.) C.DC. in DC. Prodr. 16(1): 258. 1869.

LOJA: along Río Masanaco, about 40 km south of Loja, 1920 m, July 9–12, 1944, *Jorgensen & Prieto JP59.*

Piper huigranum Trel. & Yun. Pip. North. S. Am. 188. *f. 147.* 1950.

CHIMBORAZO: cañon of the Río Chanchan, about 5 km north of Huigra (moist forested valleys in the afternoon fog-belt), 1500–1950 m, May 19–28, 1945, *E-3291, E-3359.*

Piper supernum Trel. & Yun. Pip. North. S. Am. 192. *f. 151.* 1950.

Junction of GUAYAS, CAÑAR, CHIMBORAZO & BOLIVAR: foothills of the western cordillera near the village of Bucay, 300–375 m, June 8–15, 1945, *E-3800.*

SANTIAGO-ZAMORA ("Oriente"): from Mendez to crossing of Río Paute, 570–630 m, Dec 14, 1944, *E-1505.* The leaves on this specimen are not so rugose as those on the type.

Piper lanceaefolium H.B.K. Nov. Gen. & Sp. 1: 49. 1815.

AZUAY: the eastern cordillera, 1–8 km north of the village of Sevilla de Oro, 2400–2700 m, July 27–Aug 12, 1945, *E-4494.*

PICHINCHA: western slope of the cordillera, along the road from Quito to Sta. Domingo de los Colorados, 2100–2550 m, Jan 15, 1945, *E-1725.*

Piper lanceaefolium var. latifolium Sodiro, Contr. Conoc. Fl. Ecuator. Monogr. 1. ed. 2. 47 [1901].

CHIMBORAZO: cañon of the Río Chanchan near Huigra (mostly scrub-chaparral, with a few seepages and small swamps along the river), 1200–1350 m, May 7–14, 1945, *E-3210.*

SANTIAGO-ZAMORA ("Oriente"): valley of the Río Zamora, east of Loja, along trail between Río Sabanilla and Canillones Tambo, 1350–2100 m, June 28–July 1, 1944, *E-60.*

Piper falculispicum Trel. & Yun. Pip. North. S. Am. 216. *f. 179.* 1950.

SANTIAGO-ZAMORA ("Oriente"): upland along Río Upano just north of junction with Río Chupiantza, near Mendez, 525–750 m, Nov 14, 1944, *E-991.*

This specimen agrees well with those previously examined with the exception that the main nerves are not so strongly cross-connected upward, the spikes are more slender, and the fruit is more trigonous.

Piper lineolatifolium Trel. & Yun. Pip. North. S. Am. 223. *f. 185.* 1950.

SANTIAGO-ZAMORA ("Oriente"): uplands along Río Upano just north of junction of Río Chupiantza, near Mendez, 525–750 m, Nov 14, 1944, *E-995;* Cordillera Cutucú, ca 2° 40' S, 78° W, western side of Cutucú, 870–900 m, Nov 17–Dec 5, 1944, *E-1074.*

Piper cumanense H.B.K.Nov. Gen. & Sp. **1**: 47. 1815.

SANTIAGO-ZAMORA ("Oriente"): uplands along Río Upano just north of junction with Río Chupiantza, near Mendez, 525–750, Nov 14, 1944, *E*-989.

This specimen agrees reasonably well with this species though there are several minor differences.

Piper dendropse Trel. Field Mus. Publ. Bot. **13**: 158. 1936.

SANTIAGO-ZAMORA ("Oriente"): valley of the Río Zamora, east of Loja, along trail between Río Sabanilla and Canillones Tambo, 1350–2100 m, June 28–July 1, 1944, *E-59.*

Piper meraense Trel. & Yun. Pip. North. S. Am. 242. *f. 210.* 1950.

SANTIAGO-ZAMORA ("Oriente"): above Río Upano, near junction with Paute, near Mendez, 525–750 m, Nov 13, 1944, *E-953;* Cordillera Cutucú, ca 2° 40' S, 78° W, junction of Ríos Itzintza and Chupiasa, 1050 m, Nov 17–Dec 5, 1944, *E-1399.*

The leaves on this specimen are somewhat larger than those on other specimens seen of this species.

Piper chimborazoense Yuncker, sp. nov.

Frutex; foliis subrhombico-ellipticis, scabridis, apice longius acuminatis brevi-mucronatis, basi inaequilateralibus, supra adpresse pubescentibus, subtus villosis, a parte infera pinnatim venosis; ovario ovoideo; stigmatibus sessilibus.

Intricately branched shrub, 1.5–3 m tall; upper internodes slender, 2–6 cm or more long, retrorsely subhispid; leaves subrhombic-elliptic, somewhat scabrid, the apex sharp-acuminate, shortly mucronate, the base inequilateral, one side 2 mm shorter, acute or obtusish, the longer side narrowly rounded, obtuse or cordulate, 4–6 cm wide × 9–15 cm long, appressed-pubescent, at least on the nerves, above, subvillous beneath, the hairs denser and erect to subappressed on the nerves, ciliate, pinnately nerved from the lower half, the nerves 4–5 on each side, submarginally loop-connected, with cross-connecting, scarcely anastomosing nervules, drying thin, translucent, pellucid-dotted; petiole about 5–10 plus 2 mm long, hispid, vaginate at the base; spikes erect, 2–3 mm thick × 3–6 cm long; peduncle 1.5 cm long, slender, hairy; bracts triangular- or round-peltate, with brown centers and dense yellow fringe; ovary ovoid, glabrous; stigmas rather short, sessile; fruit not matured.

CHIMBORAZO: cañon of the Río Chanchan, about 5 km north of Huigra, moist forested valleys in the afternoon fog-belt, 1500–1950 m, May 19–28, 1945, *E-3310* (TYPE), *E-3422.*

This species resembles *P. armatum* to some extent but differs in the shorter hairs on the young stems, fewer nerves, shorter spikes, longer peduncles, and glabrous ovaries.

Piper verruculaefolium Trel. Field Mus. Publ. Bot. 13: 250. 1936.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, western side of Cutucú, 870–900 m, Nov 17–Dec 5, 1944, *E-1075.*

Piper prietoi Yuncker, sp. nov.

Frutex; foliis lanceolato-ellipticis, apice acute acuminatis, basi inaequilateralibus, obtusis vel ad petiolum abrupte acutis, supra plus minusve scabridis, glabris, subtus ad venas adpresse pubescentibus, a parte infera pinnatim; spicis curvis; drupa obovoidea apice truncata vel depressa puberula; stigmatibus sessilibus.

Nodose shrub, 4 m tall; upper internodes slender, 4–8 cm long, granular, retrorsely hispid, glabrescent; leaves lance-elliptic, 3.5–6 cm wide × 11–14 cm long, the apex sharp-acuminate, the base inequilateral, obtuse or abruptly acutish at the petiole, one side rounded and about 2 mm longer, somewhat scabrid, glandular-dotted, glabrous above and dark green when growing, almost white beneath with the nerves appressed-pubescent, pinnately nerved from the lower half, the nerves 4 on each side with cross-connecting-anastomosing nervules, drying papery, subopaque; petiole 5 plus 2 mm long or up to 10 mm on the lower leaves, retrorsely hispid, vaginate near the base; spikes 3 mm thick × 8 cm long, curved, apiculate with a hispidulous tip up to 5 mm long; peduncle 2–3.5 cm long, slender, hispidulous, glabrescent; bracts triangular-subpeltate, short-fringed; fruit obovoid, the apex truncate or depressed, puberulent; stigmas slender, sessile.

SANTIAGO-ZAMORA ("Oriente"): eastern slopes of the cordillera, valley of the Río Negro, near junction of Ríos Pailas and Negro, on the trail to Mendez, 1800–2250 m, Aug 20–24, 1945, *Francisco Prieto (Camp E-4909)* (TYPE).

This species appears to be near the *P. hispidum* complex. It differs in its 4-nerved leaves, curved, rather long-apiculate spikes, and long peduncles.

Piper perstrigosum Yuncker, sp. nov.

Frutex; foliis lanceolato-ellipticis, apice acute acuminatis, basi inaequilateralibus, supra strigosis plus minusve scabridis, subtus strigosis, a parte infera pinnatim venosis; petiolo ad medium vaginato-alato; ovario ovoideo, substyloso.

Shrub, 2 m tall, nodose, apparently twiggy; upper internodes mostly 2–4 cm long, rather densely gray-strigose, the hairs closely appressed upward; leaves deep green above with silvery sheen, very pale beneath when growing, lance-elliptic, the apex sharp-acuminate, the base narrowed downward, inequilateral, one side 2 mm shorter and usually acute, the longer side obtusish, 2–3 cm wide × 8–9 cm long, strigose and slightly scabrous above, strigose beneath, the margin strongly so, pinnately nerved from the lower half, the nerves usually 5 on each side, with cross-connecting nervules, drying rather firm, subopaque; petiole 3–5 plus 2 mm long, gray-strigose, vaginate below the middle; spikes 3 mm thick × 3–3.5 cm long; peduncle 5–8 mm long, moderately gray-strigose; bracts round-triangular-subpeltate, yellow-fringed; ovary ovoid, tapering to a very short, stout, style-like apex, glabrous; stigmas linear, recurved; fruit not mature.

SANTIAGO-ZAMORA ("Oriente"): eastern slopes of the cordillera, valley of the Río Negro, near junction of the Ríos Pailas and Negro, on the trail to Mendez, 1800–2250 m, Aug 20–24, 1945, *Prieto* (*Camp E-4922*) (TYPE).

This species bears some resemblance to *P. zarumanum* but differs in the character of the indument, large leaves, shorter spikes, substylose ovaries, etc. The gray-strigose type of indument is a characteristic feature.

Piper aduncum L. Sp. Pl. 29. 1753.

CHIMBORAZO: cañon of the Río Chanchan near Huigra (mostly scrub-chaparral, with a few seepages and small swamps along the river), 1200–1350 m, May 7–14, 1945, *E-3054*, *E-3244.*

EL ORO: junction of Ríos Ambocas and Luis, 10 km due south of Portovelo, 600–750 m, Oct 6, 1944, *E-590.*

NAPO-PASTAZA ("Oriente"): valley of Río Pastaza and adjacent uplands, between Baños and Mera, 1050–1500 m, Apr 17, 1945, *E-2378.*

SANTIAGO-ZAMORA ("Oriente"): valley of the Río Zamora, east of Loja, near Zamora, about 900 m, June 28–July 1, 1944, *E-12;* near Mendez, 525–750 m, Nov 5–6, 1944, *E-870*; upland between the Ríos Paute and Upano, near Mendez, 525–750 m, Nov 12, 1944, *E-950.*

Piper canelosense Trel. & Yun. Pip. North. S. Am. 264. *f. 228.* 1950.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, junction of Ríos Itzintza and Chupiasa, 1050 m, Nov 17–Dec 5, 1944, *E-1403.*

Piper hispidum Sw. Prodr. Veg. Ind. Occ. 15. 1788.

SANTIAGO-ZAMORA ("Oriente"): valley of the Río Zamora, east of Loja, near Zamora, ca 900 m, June 28–July 1, 1944, *E-11*; near Mendez, 525–750 m, Nov 5–6, 1944, *E-889*; uplands along Río Upano just north of junction with Río Chupiantza, near Mendez, 525–750 m, Nov 14, 1944, *E-994.*

Piper hispidum var. **trachydermum** (Trel.) Yuncker, Ann. Missouri Bot. Gard. 37: 33. 1950.

SANTIAGO-ZAMORA ("Oriente"): uplands along Río Upano just north of junction with Río Chupiantza, near Mendez, 525–750 m, Nov 14, 1944, *E-990, E-996, E-997.*

Piper hispidum var. **lanceolatum** Trel. & Yun. Pip. North. S. Am. 274. *f. 237.* 1950.

CAÑAR: valley of Río de Cañar, near Rosario, 1170 m, Sept 6–10, 1944, *Prieto CP-25.*

In this specimen the stems are sparsely hispid and the nerves beneath are more silky-hairy than hispid but otherwise it agrees well with this variety.

Piper ignacioanum Trel. & Yun. Pip. North. S. Am. 280. *f. 244.* 1950.

GUAYAS: coastal plain, in the vicinity of Naranjito, ca 36 m, June 6–7, 1945, *E-3550.*

Junction of GUAYAS, CAÑAR, CHIMBORAZO & BOLIVAR: foothills of the western cordillera near the village of Bucay, 300–375 m, June 8–15, 1945, *E-3772*

Piper coruscans H.B.K. Nov. Gen. & Sp. 1: 53. 1815.

GUAYAS: coastal plain, in the vicinity of Naranjito, about 36 m, June 6–7, 1945, *E-3586.*

Piper archidonense Trel. Rev. Hisp.-Am. Ci. 2: 206. 1941.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, along narrow flood-plain of Río Itzintza, 1050–1110 m, Nov 17–Dec 5, 1944, *E-1227.*

Piper pilovarium Yuncker, sp. nov.

Arbor; internodiis superis conferte brunneo-pubescentibus, pilis brevibus longisque una intermixtis; foliis lanceolatis, apice attenuate acute acuminatis mucronatis, basi subaequilateraliter rotundato-cordulatis, utrinque subvillosis, a parte infera pinnatim venosis; ovario globoso, perconferte pubescente; stigmatibus deorsum pubescentibus.

Tree, 8 m tall, with trunk 20 cm in diameter; upper internodes rather slender, 4–5 cm long, lengthening downward, densely subretrorsely brown-hairy, the hairs of various lengths up to 2 mm long; leaves lanceolate, 4–7 cm wide × 15–23 cm long, the apex attenuately sharp-acuminate, the tip with a hairy mucro up to 3 mm long, the base subequilaterally rounded, cordulate, with one side 1–2 mm shorter, or occasionally acute, both sides subvillous, the nerves very densely so, the hairs suberect, slightly rugose when dry, pinnately nerved from the lower half, the nerves 5–7 on each side, with cross-connecting-anastomosing nervules, dark green above, paler beneath when growing, drying dark, opaque, glandular-dotted beneath; petiole about 5–10 mm long, densely villous, vaginate to near the blade; spikes 3–4 mm thick × 10–13 cm long; peduncle 10–15 mm long, villous; bracts stout-clavate with rounded, dome-like apex, brown-hairy; ovary globose, densely hairy, the hairs extending part way on the awl-shaped stigmas; fruit not developed.

CHIMBORAZO: cañon of the Río Chanchan, about 5 km north of Huigra, 1500–1950 m, May 19–28, 1945, *E-3439* (TYPE).

The tree-like habit of growth, densely villous stems and leaves, and especially the ovaries characterize this species.

Piper futuri Trel. & Yun. Pip. North. S. Am. 310. *f. 276.* 1950.

SANTIAGO-ZAMORA ("Oriente"): from Mendez to crossing of Río Paute, 570–630 m, Dec 14, 1944, *E-1507.*

The leaves on this specimen are smaller than those of the type collected in Putumayo, Colombia, but it agrees otherwise.

Piper piluliferifolium Trel. & Yun. Pip. North. S. Am. 315. *f. 281.* 1950.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, western side of Cutucú, 870–900 m, Nov 17–Dec 5, 1944, *E-1080.*

Piper campii Yuncker, sp. nov.

Frutex subprostratus; foliis oblique lanceolato-ellipticis, apice attenuate acuminatis, basi subaequilateralibus, supra glabris, subtus ad venas minute hirtulis, a parte infera pinnatim venosis; bracteis subglabratis; ovario globoso-ovoideo, conferte puberulo; stigmatibus sessilibus.

Sprawling, nodose shrub, to 40 cm high; internodes mostly 2–3 cm long, minutely hirtellous-glabrescent downward, finely ridged; leaves obliquely lance-elliptic, one margin nearly straight, the other curved, the midrib nearer the straight side, 3–4 cm wide × 9–12 cm long, the apex attenuately acuminate, the base narrowing downward, one side about 1 mm shorter and acutish, the longer side narrowly rounded, obtuse, glabrous above, the nerves beneath minutely hirtellous, the margin not ciliate, pinnately nerved with 3 widely spaced nerves on each side of the lower half, with cross-connecting nervules, drying somewhat shiny, papery, translucent; petiole 2–3 plus 1 mm long, hirtellous; spikes slender, as yet not mature, 1 mm thick × 2 cm long; peduncle slender, scarcely 1 cm long, minutely hirtellous; bracts somewhat cucullate, subglabrous; ovary globose-ovoid, densely puberulent; stigmas 3, slender, sessile; fruit not matured.

SANTIAGO-ZAMORA ("Oriente"): above Río Upano, near junction with Paute, near Mendez, 525–750 m, Nov 13, 1944, *E-973* (TYPE).

This species resembles *P. cisnerosense* somewhat but differs in the number of nerves, size of spikes, shape of ovary, etc. The puberulent, finely ridged stems, leaf shape, short petioles, glabrate bracts, and puberulent ovaries are distinctive features.

Piper cyphophyllopse Trel. & Yun. var. **brevipes** Trel. & Yun. Pip. North. S. Am. 335. 1950

EL ORO: junction of Ríos Ambocas and Luis, 10 km due south of Portovelo, 660–750 m, Oct 6, 1944, *E-587.*

D—Midrib Branched to the Upper Fourth or Throughout

Piper andreanum C.DC. Jour. de Bot. 4: 397. 1890.

AZUAY: along the Pan-American highway, 34 km s of Cuenca, 2760 m, Sept 20, 1944, *E-454;* along the Río Matadero, west of Cuenca, 2880–3000 m, March 3, 1945, *E-1982;* Nudo de Portete, pass between headwaters of the Ríos Tarqui (Atlantic) and Giron (Pacific), about 2700 m, March 10, 1945, *E-2164;* Cruz Pamba region above Baños, ca 15 km southwest of Cuenca, 2700–3000 m, June 29–30, 1945, *Giler & Prieto* (*Camp E-3922*); vicinity of the lake in the valley of the Río Surucuchu (a branch of the Río Matadero), 18–20 km west of Cuenca, 2940–3090 m, July 16, 1945, *E-4208;* the eastern cordillera, 1–8 km north of the village of Sevilla de Oro, 2400–2700 m, July 27–Aug 12, 1945, *E-4274, E-4290, E-4516, E-4517, E-4518, E-4582, E-4667;* ridge between El Pan and Guachapala, 2250–2940 m, Sept 4, 1945, *E-5260.*

CAÑAR: north rim of the valley of Río de Cañar, near Suscal, April 23–25, 1945, *Giler* (*Camp E-2830*); region of San Marcos, about 10 km northeast of Azogues, 2850 m, Sept 25, 1944, *Prieto P-79.*

CHIMBORAZO-CAÑAR border (western escarpment): near Pimo, 3060–3120 m, July 9, 1945, *E-4127.*

LOJA: Cerro Villanaco, ca 7 km west of the city of Loja, from pass to top, 2400–2850 m, July 28, 1944, *E-234.*

Some of the specimens cited above have small leaves representative of de Candolle's var. *parvifolium.* The variation in this character on certain individual specimens, however, is so great that it is not believed worthy of taxonomic segregation. The spikes on *E-4127* are much shorter than is customary for this species. This character, too, is quite variable.

Piper nubigenum Kunth, Linnaea 13: 654. 1839.

AZUAY: vicinity of the lake in the valley of the Río Surucuchu (a branch of the Río Matadero), 18–20 km west of Cuenca, 2940–3090 m, July 16, 1945, *E-4209.*

Piper artanthe C.DC. var. **grandifolium** Yuncker, var. nov.

Frutex perramosus; foliis fere totis pinnatim venosis; drupa globoso-ovoidea, conferte pilosa; stylo perbrevi crasso.

Shrub, 3 m tall, with branches lax and much ramified, pubescent; leaves 6–10 cm wide × 14–19 cm long, pinnately nerved nearly throughout, the nerves 6–10 on each side; fruit globose-ovoid, densely pilose; stigmas linear, recurved, on a very short, stout style.

AZUAY: the eastern cordillera, 1–8 km north of the village of Sevilla de Oro, 2400–2700 m, July 27–Aug 12, 1945, *E-4481* (TYPE).

Aside from the characters as given, in particular the comparatively large leaves and densely pilose fruit, this specimen agrees very well with the Colombian *P. artanthe.*

Piper holtonii C.DC. var. **parvispicum** Yuncker, var. nov.

Frutex; foliis subtus ad venas dissite villosis.

Shrub, 1 m tall; upper internodes slender, up to 15 cm long; nerves beneath and petioles loosely villous; spikes as yet young, about 2 mm thick × 5 mm long; peduncle 2–3 mm long.

CHIMBORAZO: cañon of the Río Chanchan near Huigra (mostly scrub-chaparral, with a few seepages and small swamps along the river), 1200–1350 m, May 7–14, 1945, *E-3180 (TYPE).*

The very short spikes and villous nerves and petioles are distinctive of this variety.

Piper tuberculatum Jacq. Collect. 2: 2. *pl. 211.* 1788.

GUAYAS: coastal plain, in the vicinity of Naranjito, about 36 m, June 6–7, 1945, *E-3545.*

Piper tuberculatum var. **minus** C.DC. in DC. Prodr. 16(1): 266. 1869.

EL ORO: junction of Ríos Ambocas and Luis, 10 km due south of Portovelo, 600–750 m, Oct 6, 1944, *E-596.*

Piper arboreum Aublet, Fl. Guian. 1: 23. 1775.

Junction of GUAYAS, CAÑAR, CHIMBORAZO & BOLIVAR: foothills of the eastern cordillera near the village of Bucay, 300–375 m, June 8–15, 1945, *E-3666, E-3771.*

Piper augustum Rudge, Fl. Guian. Rar. 1: 10. *pl.* 7. 1805.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, ridge ascending into Cutucú, 900 m, Nov 17–Dec 5, 1944, *E-1095;* 840 m, *E-1118* (sterile, leaves smaller than typical); ridge between the Itzintza and Chupiasa, 1050–1200 m, Nov 17–Dec 5, 1944, *E-1257, E-1260, E-1261*; junction of Ríos Itzintza and Chupiasa, 1050 m, Nov 17–Dec 5, 1944, *E-1397*; above Río Upano, near junction with Paute, near Mendez, 525–750 m, Nov 13, 1944, *E-962.*

Piper grande Vahl var. **puberulentum** Yuncker, var. nov.

Frutex; foliis rhomboideo-ovatis, a tertio supero deorsum venosis, subtus ad venas puberulis.

Shrub; upper internodes puberulent; leaves rhomboidal-ovate, the nerves beneath puberulent, pinnately nerved in the lower half or two-thirds.

CHIMBORAZO: cañon of the Río Chanchan, about 5 km north of Huigra (moist forested valleys in the afternoon fog-belt), 1500–1950 m, May 19–28, 1945, *E-3319* (TYPE).

This specimen is just coming into flower. Except for the characters indicated it closely resembles the species.

B—Leaves Peltate

Piper albert-smithii Trel. & Yun. Pip. North. S. Am. 414. *F.* 377. 1950.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, junction of Ríos Itzintza and Chupiasa, ca 2° 40' S, 78° W, 1050 m, Nov 17–Dec 5, 1944, *E-1401, E-1408.*

This species was previously known only from near El Roble, Santander, Colombia, the type locality.

Piper sp.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, ridge just south and west of Río Itzintza, 1350–1650 m, Nov 17–Dec 5, 1944, *E-1319.*

This specimen is sterile. In general, it resembles *P. cochleatum* Sodiro, but differs in its smaller leaves and puberulent nerves.

Piper sp.

GUAYAS: coastal plain, in the vicinity of Naranjito, ca 36 m, June 6–7, 1945, *E-3619.* Sterile and unidentifiable.

POTHOMORPHE Miq.

Pothomorphe peltata (L.) Miq. Comm. Phyt. 37. 1840.

GUAYAS: coastal plain, in the vicinity of Naranjito, ca 36 m, June 6–7, 1945, *E-3552.*

EL ORO: in Moro-Moro region, about 21 miles west of Portovelo, in dense rain-forest, 1020–1260 m, Oct 7, 1944, *E-641.*

PEPEROMIA R. & P.

A—Spikes Solitary or Few, on a Common Stalk, scarcely Paniculate

B—Leaves scarcely Peltate

C—Fruit essentially Sessile

D—Fruit Apically more or less Mammiform or Stylose; Stigmas Apical or Subapical

E—Fruit Lacking a Pseudocupule; Leaves mostly Alternate

Peperomia clivigaudens Yuncker, sp. nov.

Herba conferte minute hirtula; foliis alternis rotundato-ovatis, apice rotundatis vel subacutis, basi rotundato-cordulatis, 11-plinerviis, supra glabris; spicis nonnumquam solitariis vel pro more binis pluribusve in panicula elongata bracteatis dispositis; drupa globoso-ovoidea apice obtuse obliqua.

A rather large, terrestrial, branched herb, up to 80 cm tall; stems, peduncles, petioles and nerves beneath densely minutely hirtellous; leaves alternate, round-ovate, 10–17 cm wide × 12–21 cm long, the apex rounded or narrowed and subacute, the base rounded, cordulate or shallowly cordate, the margins decurrent on the petiole, deep green above with paler intercostal mottling, red or purple beneath when living, 11-nerved, the nerves coalescing within the lowermost 1 cm or subpalmate in small leaves, dark-glandular-dotted by transmitted light; petiole from 5 cm long above to 15 cm or more long on large lower leaves; spikes densely flowered, 2–3 mm thick × 10–15 cm long, occasionally solitary but more commonly 2–several in elongated, umbellate-paniculate, branch-like clusters with reduced bract-like leaves; peduncle of individual spikes mostly 4–9 cm long; bracts rounded, peltate; fruit globose-ovoid, about 0.8 mm long, the apex bluntly oblique; stigma inconspicuous, slightly subterminal.

SANTIAGO-ZAMORA ("Oriente"): eastern slope of the cordillera, valley of the Ríos Negro and Chupianza, on the trail from Sevilla de Oro to Mendez, between St. Elena and Tres Ranchos, 870–990 m, Nov 1, 1944, *E-831*; valleys and cliff-sides of small streams entering Río Paute, 2–3 km west of Mendez, 570 m, Dec 13, 1944, *E-1470* (TYPE).

The large plants, large, rounded-ovate leaves, minute pubescence, and type of inflorescence are distinctive characters of this species.

Peperomia enantiostachya C.DC. Bull. Herb. Boiss. 6: 514. 1898.

LOJA: Hacienda Anganuma, at headwaters of Río Cachiyacu, about 46 km south of Loja, 2640 m, July 13–16, 1944, *Jorgensen & Prieto JP-42*

Peperomia disjunctiflora Yuncker, sp. nov.

Herba glabra; foliis alternis, apice attenuatis acute acuminatis, basi cuneatim decurrentibus, supra minute hirtulis glabrescentibus, subtus glabris, 5-plinerviis; petiolo longitudinaliter costulato; drupa ovoidea; stigmate apicali partito.

A terrestrial, rhizomatous-assurgent herb, forming large colonies; rhizome-branches brownish, simple, erect, up to 15 cm or more tall, glabrous; internodes from 5 mm long above to 2 cm on the mature rhizome, the leaf-scars raised, conspicuous; leaves alternate, lance-elliptic, the apex attenuately sharp-acuminate, the base cuneate-decurrent, 1.5–2.3 cm wide × 5–7 cm long, hirtellous-glabrescent above, glabrous and paler beneath, rather obscurely glandular-dotted, 5-plinerved, the nerves coalescing mostly within the lowermost 5 mm, the margin ciliolate upward; petiole mostly 5–10 mm long, glabrous, shallowly channeled, narrowly margined downward by the decurrent blade margins; spikes very slender, mostly 4–6 cm long, in the axils of small, leaflike bracts on slender axillary, glabrous, panicle-like branches longer than the subtending leaf, very loosely flowered; peduncle 5–10 mm long, glabrous; floral bracts ovate-orbicular, peltate below the middle; fruit ovoid; stigma apical, divided, pilose.

SANTIAGO-ZAMORA ("Oriente"): eastern slopes of the cordillera, valley of the Río Negro, near junction of Ríos Pailas and Negro, on the trail to Mendez, 1800–2250 m, Aug 20–24, 1945, *Prieto* (*Camp E-4931*) (TYPE).

The plinerved, lance-elliptic leaves, short internodes, panicle-like fruiting branches, loosely flowered spikes, and apical, divided stigmas are characteristic features of this species.

Peperomia acuminata R. & P. Fl. Peruv. & Chil. 1: 32. *pl. 51, f a.* 1798.

AZUAY: the eastern cordillera, 1–8 km north of the village of Sevilla de Oro, 2400–2700 m, July 27–Aug 12, 1945, *E-4400*.

LOJA-"ORIENTE" border: crest of the Cordillera de Zamora, east of Loja, ca 3000 m, July 2, 1944, *E-89*; Nudo de Guagrauma, about 12 km south of Zaraguro, Sotobosque, 2850–3150 m, July 13, 1944, *E-139*.

Peperomia panamensis C.DC. Candollea 1: 329. 1923.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, on banks of Río Itzintza, 1050 m, Nov 17–Dec 5, 1944, *E-1208*.

Peperomia stilifera Yuncker in Trel. & Yun. Pip. North. S. Am. 484. *f. 426*. 1950.

SANTIAGO-ZAMORA ("Oriente"): eastern slope of the cordillera, valley of Ríos Negro and Chupianza, on the trail from Sevilla de Oro to Mendez, region of Tambo Pilas, near mouth of Río Patos, 1950–2250 m, Oct 31, 1944, *E-762*; Tambo Consuelo to Tambo Cerro Negro, 2400–2880 m, Dec 17, 1944, *E-1615*; near junction of Ríos Pailas and Negro, 1800–2250 m, Aug 20–24, 1945, *Prieto* (*Camp E-4908*).

Peperomia stilifera var. nana Yuncker, var. nov.

Herba parva, stolonifera; foliis rotundato-ovatis, palmatim 5-nerviis.

Small, trailing herb; stem about 1 mm thick when dry; leaves round-ovate, mostly 1–1.5 cm wide, palmately 5-nerved; petiole scarcely 1 cm long; spikes up to 5 cm long; peduncle about 1 cm long.

AZUAY: the eastern cordillera, 1–8 km north of the village of Sevilla de Oro, 2400–2700 m, July 27–Aug 12, 1945, *E-4463* (TYPE).

The smaller size of all parts of the variety is in strong contrast with those specimens which represent the species. This species is readily recognized by the winged ridges on the stems and leaves, and the character of the stiliferous fruits. In the variety the wings are discontinuous, short, and more or less cristate.

E—Fruit mostly with a Pseudocupule; Leaves commonly Opposite or Verticillate

Peperomia reflexa (L.f.) A. Dietr. var. **americana** (Miq.) Dahlst. Sv. Vet. Akad. Handl. 33(2): 175. 1900.

CHIMBORAZO: cañon of the Río Chanchan, about 5 km north of Huigra (moist forested valleys in the afternoon fog-belt), 1500–1950 m, May 19–28, 1945, *E-3277*.

LOJA: Hacienda Anganuma, at headwaters of Río Cachiyacu, about 46 km south of Loja, 2520 m, July 13–16, 1944, *Jorgensen & Prieto JP-43*.

Peperomia gaultheriaefolia Sodiro, Contr. Conoc. Fl. Ecuator. Monogr. 1. ed. 2. Nuev. Adic. 11 [1902].

SANTIAGO-ZAMORA: low hills west of Río Upano, along Río Chupiangas, 750–960 m, Nov 20–22, 1944, *Prieto ChuP-22*.

Peperomia guttulata Sodiro var. **puberulenta** Yuncker, var. nov.

Herba pendula epiphytica puberula; caule pergracili.

A pendent, puberulent, vine-like epiphytic herb with very slender stems.

AZUAY: the eastern cordillera, 1–8 km north of the village of Sevilla de Oro, 2400–2700 m, July 27–Aug 12, 1945, *E-4478* (TYPE).

The species was described by Sodiro as having stems 2 mm thick and all parts glabrous. The stems of the specimen here described are scarcely 1 mm thick (when dry) and, with the exception of the upper leaf-surfaces, finely but obviously puberulent. The type of *P. guttulata* has not been seen but from the evidence available this variety appears to be very closely related to it.

Peperomia hartwegiana Miq. Lond. Jour. Bot. 4: 425. 1845.

AZUAY: Páramo de Tinajillas and surrounding chaparral and forests, 30–50 km south of Cuenca, 3150 m, Sept 20, 1944, *E-466*; Cruz Pamba region above Baños, about 15 km southwest of Cuenca, 2700–3000 m, June 29–30, 1945, *Giler & Prieto* (*Camp E-3926*); vicinity of the lake in the valley of the Río Surucuchu (a branch of the Río Matadero), 18–20 km west of Cuenca, 2940–3090 m, July 16, 1945, *E-4211A, E-4211B, E-4211C*.

CHIMBORAZO-CAÑAR border (western escarpment): near Tipococha, 2940–3120 m, July 6–9, 1945, *E-4064*.

The leaves on some of these specimens are up to 1.5 cm wide × 2–2.5 cm long, much larger than is common for most specimens previously examined of this species. Variation in size occurs to such an extent on some of the specimens that it does not appear advisable to recognize the large-leaved specimens as unique. All agree in the presence of the stag-horn-like pubescence.

D—Fruit and Ovary Apically Oblique, Scutelliform, or Long- or Short-Rostrate; Stigmas Subapical

F—Fruit Globose-Ovoid with Obliquely Short-Pointed Apex

Peperomia epilobioides Trel. & Yun. Pip. North. S. Am. 551. *f. 483.* 1950.

AZUAY: Río León, a branch cañon, 1920 m, Oct 2, 1944, *E-546*; along the Río Matadero, west of Cuenca, 2550–2700 m, March 3, 1945, *E-1925*; Cruz Pamba region above Baños (ca 15 km southwest of Cuenca), 2700–3000 m, June 29–30, 1945, *E-3928*; vicinity of the lake in the valley of the Río Surucuchu (a branch of the Río Matadero), 18–20 km west of Cuenca, 2940–2090 m, July 16, 1945, *E-4210*; the eastern cordillera, 1–8 km north of the village of Sevilla de Oro, 2400–2700 m, July 27–Aug 12, 1945, *E-4486*.

CAÑAR: region of San Marcos, about 10 km northeast of Azogues, 2850 m, Sept 25, 1944, *Prieto P-103*, *P-106*; Parroquia Luis Cordero, at Ayapamba, about 15 km northeast of Azogues, 2940–2970 m, Sept 29, 1944, *Prieto P-159*; valley of Río de Cañar, near El Corazon, between S. vicente and Rosario, 2490 m, Sept 6–10, 1944, *Prieto CP-9*; dry chaparral scrub and páramo, with occasional moist valleys, near El Tambo (ca 69 km by RR south of Sibambe), 2850–3000 m, May 4, 1945, *Giler & Prieto* (*Camp E-2918*).

Peperomia microphylla H.B.K. Nov. Gen. & Sp. **1**: 69. *pl. 15.* 1815.

LOJA: Cerro Villanaco, ca 7 km west of the city of Loja, 2400–2850 m, from pass to top, July 28, 1944, *E-216*.

CAÑAR: Parroquia Pindilic, on Río Dudas, about 30 km northeast of Azogues, 2970 m, Sept 28, 1944, *Prieto P-134*.

Peperomia galioides H.B.K. Nov. Gen. & Sp. **1**: 71. *pl. 17.* 1815.

AZUAY: along the Río Tarqui, 4–18 km south of Cuenca, 2490–2700 m, Feb 26, 1945, *E-1849*.

CAÑAR: region of San Marcos, about 10 km northeast of Azogues, 9500 ft, Sept 25, 1944, *Prieto P-104*.

CHIMBORAZO: cañon of the Río Chanchan near Huigra (mostly scrub-chaparral, with a few seepages and small swamps along the river), 1200–1350 m, May 7–14, 1945, *E-3075*; about 5 km north of Huigra (moist forested valleys in the afternoon fog-belt), 1500–1950 m, May 19–28, 1945, *E-3299*.

LOJA: Nudo de Cajanuma, 7 km south of Loja, 2400–2520 m, July 9, 1944, *E-123*.

Peperomia inaequalifolia R. & P. Fl. Peruv. & Chil. **1**: 30. *pl. 46, f. a.* 1798.

CAÑAR: region of San Marcos, about 10 km northeast of Azogues, 2850 m, Sept 25, 1944, *Prieto P-105*.

Peperomia lanceolata C.DC. Jour. Bot. **4**: 145. 1866.

CHIMBORAZO: cañon of the Río Chanchan, about 5 km north of Huigra (moist forested valleys in the afternoon fog-belt), 1500–1950 m, May 19–28, 1945, *E-3385*.

Peperomia campii Yuncker, sp. nov.

Herba assurgens; foliis superis verticillatim 3–6, suboblanceolato- vel lanceolato-ellipticis, utrinque acutis, glabris, palmatim 3–5-nerviis, foliis inferis oblanceolatis vel obovatis, utrinque hirtulis, apice obtusis, basi acutis, valde reflexis; spicis numerosis; drupa globoso-ovoidea, apice obliqua; stigmate subapicali.

A terrestrial herb, ascending from a decumbent rooting base up to 70 cm or more tall, 5 mm thick below when dry, with slender, wand-like, divergent branches above; internodes from 1–2 cm long below to 5–8 cm above, minutely hirtellous; leaves in whorls of 3–6, the upper leaves 10–13 mm wide × 20–30 mm long, suboblanceolate- or lance-elliptic, acute at both ends, spreading, glabrous except for fine ciliolation near the apex, palmately 3- or obscurely 5-nerved, the midrib branching upward, paler and glandular-dotted beneath, drying membranous, translucent, the lower leaves scarcely 10 mm wide × 10–20 mm long, oblanceolate or obovate, often red beneath when growing, the apex obtuse, the base acute, hirtellous on both sides, palmately 3-nerved, drying coriaceous and opaque, strongly reflexed; petioles from hirtellous and 2 mm long on the lower leaves to glabrate and 5 mm long above; spikes numerous, very slender, loosely flowered, solitary or in terminal and axillary clusters of two or three, up to 10 cm or more long; peduncle slender, 10–15 mm long, sparsely hirtellous-glabrescent; bracts round, peltate; fruit about 0.8 mm long, globose-ovoid, the apex oblique; stigma subapical.

CHIMBORAZO: cañon of the Río Chanchan near Huigra (mostly scrub-chaparral, with a few seepages and small swamps along the river), hanging over rocks, 1200–1350 m, May 7–14, 1945, *E-3020* (TYPE).

The most outstanding character of this species is the great contrast in size and shape between the leaves of the lower stem and those in the upper, branching, flowering part. The slender, spike-bearing branches and long, slender spikes are also distinctive characters.

It resembles *P. praeruptorum* of Peru to some extent but differs in the leaf characters, shorter petioles, etc. It also resembles *P. apodophylla* of Colombia but differs from that species in the heteromorphic leaves, character of the indument, and the greater length of the petioles and peduncles.

Peperomia glabella (Sw.) A. Dietr. Sp. Pl. **1**: 156. 1831.

Junction of GUAYAS, CAÑAR, CHIMBORAZO & BOLIVAR: foothills of the western cordillera near the village of Bucay, 300–375 m, June 8–15, 1945, *E-3789*.

Peperomia glabella var. **nervulosa** (C.DC.) Yuncker, Ann. Missouri Bot. Gard. **37**: 98. 1950.

SANTIAGO-ZAMORA ("Oriente"): valleys and cliff-sides of small streams entering Río Paute, 2–3 km west of Mendez, 570 m, Dec 13, 1955, *E-1489*.

Peperomia fuscipunctata Yuncker, sp. nov.

Herba subglabra assurgens; foliis alternis, distichis ellipticis vel lanceolato-ellipticis, apice attenuatis longe acuminatis, basi acutis, glabris, palmatim 5-nerviis; ovario globoso-ovoideo, apice obliquo; stigmate subapicali.

A dark-dotted, terrestrial herb, up to 30 cm tall; stems 2–3 mm thick below when dry, ascending from a decumbent rooting base, simple or occasionally branched but with small, axillary, spike-bearing branchlets upward, zigzag, glabrous except for slight pubescence opposite the decurrent petioles in younger parts, the internodes 1 cm long above to 4 cm long below; leaves alternate, distichous, elliptic or lance-elliptic, 1–2 cm wide × 5–7 cm long, the apex attenuately long-acuminate, the base acute, glabrous, ciliolate near the apex, palmately 5-nerved, drying dark above, paler beneath, membranous, translucent; petiole 5 mm or less long, winged by the decurrent blade margins, clasping at the base and decurrent, forming thin but rather prominent internodal wings, glabrous; spikes as yet immature, less than 1 mm thick × 2–4 cm long, axillary, solitary or occasionally multiple, commonly on short, axillary branchlets, moderately flowered; peduncle very slender, scarcely more than 5 mm long, glabrous; bracts round, peltate, dark-glandular-dotted; ovary globose-ovoid, in rachis pits, the apex oblique; stigma subapical; fruit not developed.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, ridge just south and west of Río Itzintza, on soil in moss, 1350–1650 m, Nov 17–Dec 5, 1944, *E-1302* (TYPE).

The densely dotted stems, leaves, etc., zigzag stem, shape of the distichous leaves, and winged internodes are distinctive of this species.

Peperomia martiana Miq. Syst. Pip. 189. 1843.

SANTIAGO-ZAMORA ("Oriente"): valley of the Río Upano, from the Río Paute north ca 17 km to the Chupiangas, uplands above Upano, 585–660 m, Dec 9, 1944, *E-1434*.

Peperomia jamesoniana C.DC. Jour. Bot. 4: 137. 1866.

Junction of GUAYAS, CAÑAR, CHIMBORAZO & BOLIVAR: foothills of the western cordillera near the village of Bucay, 300–375 m, June 8–15, 1945, *E-3845*.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, ridge ascending into central Cutucú, 1410–1470 m, Nov 17–Dec 5, 1944, *E-1166*.

Peperomia jamesoniana var. **longifolia** Trel. & Yun. Pip. North. S. Am. 605. *f. 530*. 1950.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, opposite Chupiantza, 600–690 m, Nov 17, 1944, *E-1029*.

Pepermomia pennellii Trel. & Yun. Pip. North. S. Am. 608. *f. 533*. 1950.

CHIMBORAZO: cañon of the Río Chanchan, about 5 km north of Huigra (moist forested valleys in the afternoon fog-belt), 1500–1950 m, May 19–28, 1945, *E-3276*; open deforested slope with small patches of scrub in the draws, directly above the village of Huigra, 1500–2100 m, May 29–31, 1945, *E-3488*.

These specimens have more definitely apically ciliolate leaves than is customary for this species.

Peperomia suratana Trel. & Yun. Pip. North. S. Am. 615. *f. 539*. 1950.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, banks of Río Itzintza, 1050 m, Nov 17–Dec 5, 1944, *E-1264*.

This specimen is poor and it is only tentatively identified as this species.

Peperomia calimana Trel. & Yun. Pip. North. S. Am. 617, *f. 541*. 1950.

SANTIAGO-ZAMORA ("Oriente"): valley of the Río Zamora, east of Loja, about 5 km downstream from Zamora, 900 m, June 28–July 1, 1944, *E-53*; Cordillera Cutucú, ca 2° 40' S, 78° W, ridge ascending into central Cutucú, 900 m, Nov 17–Dec 5, 1944, *E-1100*.

Peperomia rotundifolia (L.) H.B.K. Nov. Gen. & Sp. 1: 65. 1815.

SANTIAGO-ZAMORA ("Oriente"): valley of the Río Zamora, east of Loja, ca 5 km downstream from Zamora, 900 m, June 28–July 1, 1944, *E-52*; valley of the Río Upano, from the Río Paute north ca 17 km to the Chupiangas, uplands above Upano, 584–660 m, Dec 9, 1944, *E-1433*.

Peperomia trinervis R. & P. Fl. Peruv. & Chil. 1: 32. *pl. 50, f. b*. 1798.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, ridge just south and west of Río Itzintza, 1350–1650 m, Nov 17–Dec 5, 1944, *E-1300*.

The leaves on this specimen are more sharply acuminate than is common for the species.

Peperomia trinervis var. **subnudicaulis** Yuncker in Trel. & Yun. Pip. North. S. Am. 647. 1950.

CAÑAR: valley of Río de Cañar, near El Corazon, between S. Vicente and Rosario, 2790 m, Sept 6–10, 1944, *Prieto CP-10*.

CHIMBORAZO: cañon of the Río Chanchan, about 5 km north of Huigra (moist forested valleys in the afternoon fog-belt), 1500–1950 m, May 19–28, 1945, *E-3426*.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, ridge ascending into central Cutucú, 1310–1370 m, Nov 17–Dec 5, 1944, *E-1173*.

Peperomia trinervula C.DC. var. **suboppositifolia** Trel. & Yun. Pip. North. S. Am. 648. 1950.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, ridge just south and west of Río Itzintza, 1350–1650 m, Nov 17–Dec 5, 1944, *E-1327*.

This specimen agrees reasonably well with this variety.

F—Fruit commonly Ellipsoidal to Cylindrical with Scutelliform or Rostrate Apex

Peperomia macrostachya (Vahl) A. Dietr. Sp. Pl. 1: 149. 1831.

GUAYAS: coastal plain, in the vicinity of Naranjito, ca 36 m, June 6–7, 1945, *E-3590*.

The leaves on this specimen are larger and proportionally wider than usual for this species.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, opposite Chupiantza, 600–690 m, Nov 17, 1944, *E-1026*; ridge just south and west of Río Itzintza, 1350–1650 m, Nov 17–Dec 5, 1944, *E-1307*; east-trending slope from top of ridge down toward the Itzintza, 1440–1740 m, Nov 17–Dec 5, 1944, *E-1354* (questionably this species); eastern slope of the cordillera, valley of the Ríos Negro and Chupianza, on the trail from Sevilla de Oro to Mendez, between Tres Ranchos and Chontal, 810–1710 m, Dec 15, 1944, *E-1552* (leaves on this specimen are more ovate than usual for this species).

Peperomia macrostachya var. **nematostachya** (Link) Trel. & Yun. Pip. North. S. Am. 661. 1950.

GUAYAS: coastal plain, in the vicinity of Naranjito, ca 36 m, June 6–7, 1945, *E-3597*.

The specimens cited above show a number of minor variances from typical *P. macrostachya*. It is believed, however, that they all belong to the *macrostachya* complex.

Peperomia serpens (Sw.) Loud. Hort. Brit. 13. 1830.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, opposite Chupiantza, 600–690 m, Nov 17, 1944, *E-1057*; valleys and cliff-sides of small streams entering Río Paute 2–3 km west of Mendez, 570 m, Dec 13, 1944, *E-1497*.

Peperomia cryptostachya Trel. & Yun. Pip. North. S. Am. 674. *f. 589.* 1950.

Junction of GUAYAS, CAÑAR, CHIMBORAZO & BOLIVAR: foothills of the western cordillera near the village of Bucay, 300–375 m, June 8–15, 1945, *E-3686*.

The type of this species was collected 3 km west of Bucay at 270 m.

Peperomia obtusifolia (L.) A. Dietr. Sp. Pl. 1: 154. 1831.

CHIMBORAZO: cañon of the Río Chanchan near Huigra (mostly scrub-chaparral, with a few seepages and small swamps along the river), 1200–1350 m, May 7–14, 1945, *E-3211*; about 5 km north of Huigra (moist forested valleys in the afternoon fog-belt), 1500–1950 m, May 19–28, 1945, *E-3453*; open deforested slope with small patches of scrub in the draws, directly above the village of Huigra, 1500–2100 m, May 29–31, 1945, *E-3532*.

SANTIAGO-ZAMORA ("Oriente"): uplands along Río Upano just north of junction with Río Chupiantza, near Mendez, 525–750 m, Nov 14, 1944, *E-1010*.

Peperomia ternata C.DC. Bull. Herb. Boiss. 6: 509. 1898.

AZUAY: the eastern cordillera, 1–8 km north of the village of Sevilla de Oro, 2400–2700 m, July 27–Aug 12, 1945, *E-4331*.

CAÑAR: Parroquia Pindilic, on Río Dudas, about 30 km northeast of Azogues, 2820–2970 m, Sept 28, 1944, *Prieto P-132*, in part, mixed with *P. acuminata*.

LOJA: Nudo de Guagrauma, ca 12 km south of Zaraguro, 2850–3150 m, July 13, 1944, *E-138*.

The spikes on some of these specimens are more numerous and more paniculately arranged than as originally described.

Peperomia syringifolia C.DC. Bull. Herb. Boiss. 6: 514. 1898.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, western side of Cutucú, 870–900 m, Nov 17–Dec 5, 1944, *E-1079*.

Peperomia distachya (L.) A. Dietr. Sp. Pl. 1: 156. 1831.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, on banks of Río Itzintza, 1050 m, Nov 17–Dec 5, 1944, *E-1212*.

Peperomia ovato-lanceolata Trel. & Yun. Pip. North. S. Am. 701. *f. 623.* 1950.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, junction of Ríos Itzintza and Chupiasa, 1050 m, Nov 17–Dec 5, 1944, *E-1405*.

This specimen differs in being smaller and more erect, and in having smaller, less pointed leaves. It may represent a new variety.

C—Fruit Stipitate

Peperomia hispidula (Sw.) A. Dietr. Sp. Pl. 1: 165. 1831.

AZUAY: the eastern cordillera, 1–8 km north of the village of Sevilla de Oro, in seepage, 2400–2700 m, July 27–Aug 12 & 17, 1945, *E-4474*.

CHIMBORAZO: cañon of the Río Chanchan, about 5 km north of Huigra (moist forested valleys in the afternoon fog-belt), 1500–1650 m, May 19–28, 1945, *E-3252*.

Peperomia tuberculata Yuncker, sp. nov.

Herba repens delicata; foliis alternis rotundato-reniformibus, apice rotundatis, basi cordatis, utrinque dissite hispidis vel subglabris, palmatim 7–9–nerviis; ovario fusiformi, substyloso; stigmate apicali.

A delicate, pellucid, trailing herb; stems scarcely 1 mm thick when dry, glabrous or sparsely hispid at the nodes, rooting at the nodes, the roots filiform, frequently with smooth, fusiform tubers up to 5 mm long; internodes elongate; leaves alternate, round-reniform, the apex rounded, the base cordate, 8–15 mm wide, loosely hispid on both sides with flaccid hairs or subglabrous, palmately 7–9–nerved, the nerves branching upward, joined with a delicate submarginal nervule, drying very thin and transparent; petiole slender, variable in length, glabrous or sparsely hairy; spikes (?) leaf-opposed, 1–2 cm or (?) more long, loosely flowered; peduncle glabrous; bracts small, round, peltate; ovary fusiform, tapering to a style-like apex, stipitate (?); stigma apical; fruit not matured.

CAÑAR: dry chaparral scrub and páramo, with occasional moist valleys, near El Tambo (ca 69 km by RR south of Sibambe), 2850–3000 m, Apr 22, 1945, *Giler* (*Camp E-2802*) (TYPE).

This is a very delicate species apparently closely related to *P. hispidula* from which it differs in the more trailing habit of growth and smaller, reinform-cordate leaves. The only spike present is immature but it very closely resembles those of *P. hispidula* at the same stage of maturity. It is also reminiscent of *Verhuellia*, but there is no evidence of more than one style or stigma.

The root tubers, while not unique in this species, are more obvious than is usual.

It differs from *P. perhispidula* of Peru in its more glabrous, prostrate stems, its cordate, 7–9–nerved leaves, and its longer petioles.

Peperomia mandonii C.DC. in DC. Prodr. 16(1): 395. 1869.

CHIMBORAZO: cañon of the Río Chanchan near Huigra (mostly scrub-chaparral, with a few seepages and small swamps along the river), 1200–1350 m, May 7–14, 1945, *E-3034*; about 5 km north of Huigra (moist forested valleys in the afternoon fog-belt, 1500–1750 m, May 19–28, 1945, *E-3286*.

Peperomia emarginella (Sw.) C.DC. in DC. Prodr. 16(1): 437. 1869

Junction of GUAYAS, CAÑAR, CHIMBORAZO & BOLIVAR: foothills of the western cordillera near the village of Bucay, 300–375 m, June 8–15, 1945, *E-3843*.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, along narrow flood-plain of Río Itzintza, 1050–1110 m, Nov 17–Dec 5, 1944, *E-1237.*

B—Leaves Peltate

Peperomia peruviana (Miq.) Dahlst. Sv. Vet. Akad. Handl. 33(2): 32. 1900.

AZUAY: Nudo de Portete, pass between headwaters of the Ríos Tarqui (Atlantic) and Giron (Pacific), about 2700 m, March 10, 1945, *E-2114.*

Peperomia villibacca Yuncker in Trel. & Yun. Pip. North. S. Am. 715. *f.* 636. 1950.

AZUAY: the eastern cordillera, 1–8 km north of the village of Sevilla de Oro, 2400–2700 m, July 27–Aug 12, 1945, *E-4443.*

A—Spikes Numerous, more or less Paniculately Arranged

Peperomia espinosae Yuncker in Trel. & Yun. Pip. North. S. Am. 735. *f.* 659. 1950.

LOJA: Cerro Villanaco, about 7 km west of the city of Loja, in deep shade along moist ravines, 2400–2850 m, Oct 9, 1944, *E-667.*

Peperomia peltigera C.DC. Bull. Herb. Boiss. 6: 505. 1898.

AZUAY: about 3 km north of Sevilla de Oro, in a Cholo garden, 2400 m, Aug 28, 1945, *E-5025.*

CHIMBORAZO: Cañon of the Río Chanchan, about 5 km north of Huigra, 1500–1950 m, May 19–28, *E-3415.*

Peperomia omnicola C.DC. var. **oblanceolata** Trel. Jour. Wash. Acad. 16: 206. 1926.

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, opposite Chupiantza, 600–690 m, Nov 17, 1944, *E-1052*; floodplain of Río Itzintza, 1050–1110 m, Nov 17–Dec 5, 1944, *E-1241.*

Peperomia verticillatispica Trel. & Yun. Pip. North. S. Am. 745. *f.* 669. 1950.

Junction of GUAYAS, CAÑAR, CHIMBORAZO & BOLIVAR: foothills of the western cordillera near the village of Bucay, 300–375 m, June 8–15, 1945, *E-3697.*

Peperomia pyramidata Sodiro, Contr. Conoc. Fl. Ecuator. Monogr. 1. ed. 2. 151 [1901].

SANTIAGO-ZAMORA ("Oriente"): Cordillera Cutucú, ca 2° 40' S, 78° W, ridge just south and west of Río Itzintza, 1350–1650 m, Nov 17–Dec 5, 1944, *E-1315.*

DePauw University
Greencastle, Indiana

PLANTS COLLECTED IN ECUADOR BY W. H. CAMP

UMBELLIFERAE

MILDRED E. MATHIAS AND LINCOLN CONSTANCE

Hydrocotyle acutifolia R. & P.

Santiago-Zamora ("Oriente"): corolla cream-white; along narrow floodplain of Río Itzintza, altitude 3500–3700 ft., Cordillera Cutucú, ca. 2° 40′ S., 78° W., November 17–December 5, 1944, *E-1239.* This species has hitherto been known only from central and southern Peru.

Hydrocotyle humboldtii A. Rich.

Azuay: trailing over banks, the stems and petioles red, the leaves deep green above, usually dull, pale green and nitid below, the corolla segments dull white, the ovary and disc green; Pacific side of pass, Nudo de Portete, pass between headwaters of the Ríos Tarqui (Atlantic) and Giron (Pacific), ca. 9000 ft. elevation, March 10, 1945, *E-2157.* Loja-"Oriente" border: trailing on banks; crest of the Cordillera de Zamora east of Loja, ca. 10,000 ft. elevation, July 2, 1944, *E-104.* The species has previously been reported from Pichincha and Loja.

Hydrocotyle incrassata R. & P.

Azuay: scrambling on banks, the perianth yellowish; in the subpáramo chaparral along the Río Cumbe (25–30 km. south of Cuenca), 10,000 ft. elevation, March 7, 1945, *E-2056;* plants in clumps from subterranean rhizome, the perianth pale greenish-yellow; the eastern Cordillera 1–8 km. north of the village of Sevilla de Oro, 8000–9000 ft. elevation, July 27–August 12, 1945, *E-4313.* This plant has been known hitherto in Ecuador only from Chimborazo.

Hydrocotyle leucocephala C. & S.

Junction of Guayas, Cañar, Chimborazo & Bolívar: leaves green above, pale below, the flowers cream-white; in seepage, foothills of the western Cordillera near the village of Bucay, 1000–1250 ft. elevation, June 8-15, 1945, *E-3741.* Chimborazo: flowers white; in wet areas, cañon of the Río Chanchan near Huigra, 4000–4500 ft. elevation (mostly scrub-chaparral with a few seepages and small swamps along the river), May 7–14, 1945, *E-3084.*

Hydrocotyle tambalomaensis H. Wolff.

Azuay: trailing over banks, the stems purplish, the leaves very dark green above, pale green below, the perianth pale green; the eastern Cordillera, 1–8 km. north of the village of Sevilla de Oro, 8000–9000 ft. elevation, July 27–August 12, 1945, *E-4297.* This species has been known hitherto only from central Ecuador (Chimborazo, Bolívar, etc.).

Hydrocotyle yanghuangensis (Hieron.) Math.

Azuay: plants on soil or scrambling up mossy trees and rooting at nodes, the stems and petioles usually purplish, the leaves deep green, subnitid above, paler below, the perianth dull purplish overcast on light green; the eastern Cordillera, 4–6 dm. north of the village of Sevilla de Oro, 9000–10,000 ft. elevation, August 16, 1945, *E-4731.*

Spananthe paniculata Jacq.

Azuay: base of stem nigrescent-purple, the petals white; weed in wet fields, quebradas leading into the Río Collay, 3–8 km. north of Sevilla de Oro, 7000–

8300 ft. elevation, September 3, 1945, *E-5206*. Chimborazo: plants sometimes flowering when small but often much branched and forming loose tangled clumps to 1 m. high and several meters across or sometimes climbing in shrubs 2–3 m. by means of erratic inflorescence branches, the stems hollow, the leaves deep green above, pale green below, the stipular setae and those at blade-base nigrescent-purple, the corolla white; cañon of the Río Chanchan near Huigra, 4000–4500 ft. elevation (mostly scrub-chaparral with a few seepages and small swamps along the river), May 7–14, 1945, *E-3202, E-3000.*

Bowlesia setigera R. & P.

Cañar: flowers greenish, the anthers and spines on fruit purplish; dry chaparral scrub and páramo, with occasional moist valleys, near El Tambo (ca. 69 km. by rail south of Sibambe), 9500–10,000 ft. elevation, April 22, 1945, *E-2815* (collected by Manuel Giler).

Azorella erenata((R. & P.) Pers.

Carchi: in dense tufts, the flowers white; páramo on southeast slopes of Volcán Chiles, 10,800–11,300 ft. elevation, August 17, 1944. *E-323.*

Azorella lehmannii Hieron.

Azuay: leaves shining; Páramo de Tinajillas and surrounding chaparral and forests, 30–50 km. south of Cuenca, 11,000–11,500 ft. elevation, March 17, 1945, *E-2275.* Cañar: plants forming mats to 3 m. in diameter, the perianth segments a dirty (Isabellina) white; uplands called "Huairacaja," 10–20 km. northeast of Azogues, 11,000 ft. elevation, February 2, 1945, *E-1751.* This species has not previously been reported from any definite locality.

Azorella pedunculata (Spreng.) Math. & Const., comb. nov.

Bolax pedunculatus Spreng. Sp. Umbell. 10. 1818.
Azorella pedunculata Willd.; Spreng. loc. cit. in syn.
Pectophytum pedunculare Kunth in H.B.K. Nov. Gen. & Sp. 5: 22. *pl. 425.* 1821.
Azorella peduncularis Wedd. Chlor. And. 2: 196. 1860.

Azuay: dense mats in meadow; along the Río Matadero west of Cuenca, 10,000-10,500 ft. elevation, March 3, 1945, *E-2009.* Cañar: in large "cushions" to 2 m. in diameter, the perianth segments yellowish-white; uplands called "Huairacaja," 10–20 km. northeast of Azogues, 11,000 ft. elevation, February 2, 1945, *E-1752.* Carchi: in dense tufts, the flowers white; páramo on southeast slopes of Volcán Chiles, 10,800–11,300 ft. elevation, August 17, 1944, *E-321.*

Eryngium foetidum L.

Santiago-Zamora ("Oriente"): plants common along trails and in openings, pungent-aromatic, the flowers white, the leaves used to season foods (Jivaro name "Nupai" or "Nupa"); valleys and cliff-sides of small streams entering Río Paute, 2–3 km. west of Mendez, altitude 1900 ft., December 13, 1944, *E-1491.*

Eryngium humile Cav. var. **caulescens** Jameson.

Azuay: leaves bright green above, paler below, the bracts pale outside with silvery interior and margins, the flowering heads purple-nigrescent; near Tarqui along the Río Tarqui, 4–18 km. south of Cuenca, 8300–9000 ft. elevation, March 7, 1945, *E-2035;* bracts green outside, silvery inside, the flower heads deep purple-blue; Parroquia Jose Victor Izquierdo, north of Paute at "Pupazche," valley of the Río Paute between Paute and Cuenca, 7200–8000 ft. elevation (dry cliffs, rocky hillsides and occasional ravines), April 13, 1945, *E-2578* (collected by F. Prieto). Cañar: bracts pale green outside, silvery inside, the heads nigrescent-blue; north rim of the valley of the Río de Cañar between Tambo and Suscal, April 23, 1945, *E-2788A;* same locality but from different colony, *E-2788B;* flowers deep blue; Parroquia Louis Cordero at Ayapamba (ca. 15 km. ENE of Azogues), 9800–9900 ft. elevation, September 29, 1944, *F. Prieto P-160.* Loja: bracts green outside, margin with white line, inside white, the flowers deep purple-blue, the stamens yellow; Cerro Villanaco (ca. 7 km. west of the city of Loja), 8000–9500 ft. elevation (from pass to top), July 28, 1944, *E-240.*

Eryngium humile Cav. **var. pulchellum** Wedd.

Azuay: bracts green outside, silvery inside, the heads purple-nigrescent; along the Río Matadero west of Cuenca, 10000–10500 ft. elevation, March 3, 1945, *E-2013;* vicinity of the lake in the valley of the Río Surucuchu (a branch of the Río Matadero), 18–20 km. west of Cuenca, 9800–10300 ft. elevation, July 16, 1945, *E-4220.*

Arracacia wigginsii Const.

Azuay: plants small or in age much branched and up to 3 m. high, the stems purplish, the leaves deep green, the corolla bright green; Cruz Pamba region above Baños (ca. 15 km. southwest of Cuenca), 9000–10000 ft. elevation, June 29–30, 1945, *E-3934* (collected by Giler & Prieto).

Arracacia xanthorrhiza Bancroft.

Cañar: coarse herb to 1 m. high; between Tambo and Suscal, north rim of the valley of the Río de Cañar, 2000–3000 m. elevation, April 23, 1934, *E-2778* (collected by M. Giler).

Neonelsonia acuminata (Benth.) Coult. & Rose.

Azuay: plants scrambling to 3 m. through shrubs, the leaves pale green, the corolla pale yellowish-green; the eastern Cordillera, 1–8 km. north of the village of Sevilla de Oro, 8000–9000 ft. elevation, July 27–August 12, 1945, *E-4503;* sprawling plants in wet ravines, the stem and petioles red, the leaves pale green, the perianth segments yellowish-green, tipped, or the outside suffused with red; Pacific side of pass, Nudo de Portete, pass between headwaters of the Ríos Tarqui (Atlantic) and Giron (Pacific), altitude ca. 9000 ft., March 10, 1945, *E-2168.*

Apium leptophyllum (Pers.) F. Muell.

Azuay: in shaded area; the eastern Cordillera, 1–8 km. north of the village of Sevilla de Oro, 8000–9000 ft. elevation, August 12, 1945, *E-4650.* Cañar: perianth white; dry chaparral scrub and páramo, with occasional moist valleys, near El Tambo (ca. 69 km. by rail south of Sibambe), 9500 ft. elevation, May 4, 1945, *E-2907* (collected by Giler & Prieto).

Niphogeton dissecta (Benth.) F. Macbr. **var. dissecta.**

Azuay-"Oriente" border: in open páramo; Páramo del Castillo and surrounding forested areas (crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez), east of El Pan, 11000–11350 ft. elevation, December 17, 1944, *E-1627.* Azuay: leaves bright green, the perianth segments white; Páramo de Tinajillas and surrounding chaparral and forests, 30–50 km. south of Cuenca, 11000–11500 ft. elevation, March 17, 1945, *E-2247.*

Niphogeton ternata (Willd.) Math. & Const. **var. ternata.**

Azuay: plants scrambling, the leaves deep green, nitid above, pale below, the perianth greenish; the eastern Cordillera, 4–6 km. north of the village of Sevilla de Oro, 9000–10000 ft. elevation, August 16, 1945, *E-4757.*

Oreomyrrhis andicola (Kunth) Hook. f.

Cañar: perianth segments pink; on talus slope, uplands called "Huairacaja," 10–20 km. northeast of Azogues, altitude 11000 ft., February 2, 1945, *E-1774.*

Coriandrum sativum L.

Cañar: flowers white, the fruit ("Culantro") used as condiment and also for colic; near the village of San Marcos (5–8 km. northeast of Azogues), April 1, 1945, *E-2453* (collected by F. Prieto).

Daucus montanus H.&B.

Azuay: flowers white, usually with pink tinge; the eastern Cordillera, 1–8 km. north of the village of Sevilla de Oro, 8000–9000 ft. elevation, August 12, 1945, *E-4651;* flowers white, "Cuy-guañuna" (said to kill guinea pigs if fed to them); near union of Ríos Tarqui and Yanuncay, vicinity of Cuenca, 8200–8900 ft. altitude, April 14, 1945, *E-2665* (collected by F. Prieto). Chimborazo: corolla white, the fruits with purplish spines; cañon of the Río Chanchan near Huigra (mostly scrub-chaparral with a few seepages and small swamps along the river), 4000–4500 ft. elevation, May 7–14, 1945, *E-3064*. Loja: bristles on the fruit purple; on the edge of the páramo in the protection of the sotobosque, Cerro Villanaco (ca. 7 km. west of the city of Loja), 8000–9500 ft. elevation (from pass to top), July 28, 1944, *E-244*.

Lilaeopsis andina A. W. Hill f. **subulata** (Wedd.) Pérez-Moreau.

Azuay: perianth white; in moist meadow along the Matadero west of Cuenca, 8500–9000 ft. elevation, March 3, 1945, *E-1921*.

Department of Botany, University of California
Berkeley

PLANTS COLLECTED IN ECUADOR BY W. H. CAMP
ERIOCAULACEAE, VERBENACEAE

HAROLD N. MOLDENKE

ERIOCAULACEAE

Eriocaulon microcephalum H.B.K.

An alpine species found in scattered localities from Kern County, California, through the states of México, Puebla, Tamaulipas, and the Federal District, Mexico; and from the department of San José, Costa Rica, to Azuay, Carchi, Loja, and Pichincha, Ecuador, and Cajamarca, Cuzco, and Junín, Peru. *E-465, E-1681, E-2086, E-2582.*

Paepalanthus ensifolius (H.B.K.) Kunth.

A páramo species known from the high mountains of Cauca, Cundinamarca, Magdalena, and Sandanter Norte, Colombia; Azuay, Carchi, and Loja, Ecuador; and Amazonas, Peru. *E-402.*

Syngonanthus yacuambensis Moldenke.

F. Prieto P. 197, TYPE. The species is known only from the type collection.

VERBENACEAE

Aegiphila alba Moldenke.

An Ecuadorean species known from Azuay, El Oro, Esmeraldas, Guayas, Los Ríos, and Pichincha. *E-3606.*

Aegiphila bogotensis var. aequinoctialis Moldenke.

E. 4338 (TYPE), *E. 4388, E. 4419.* The species is known only from Azuay, but is apparently closely related to the rare *A. mortoni* Moldenke of Cuzco, Peru.

Aegiphila chrysantha Hayek.

A rather widespread species ranging from Chimborazo, Guayas, and Manabi, Ecuador, and Loreto, Peru, to Amazonas, Bahia, Maranhão, and Pernambuco, Brazil, and Santa Cruz, Bolivia. *E-3863.*

Aegiphila ferruginea Hayek & Spruce.

An Ecuadorean species known from Azuay, Carchi, Chimborazo, Imbabura, and Pichincha. *E-365, E-366, E-2211a.*

Aegiphila integrifolia (Jacq.) Jacks.

A very widespread and variable species ranging from Trinidad and the departments of Boyacá, Caquetá, Cauca, Chocó, Magdalena, Méta, and Valle del Cauca, Colombia, and the states of Amazonas, Bolívar, and Zulia, Venezuela, through British Guiana and French Guiana, to Napo-Pastaza and Santiago-Zamora, Ecuador, and Cuzco, Huánuco, Junín, Loreto, Puno, and San Martín, Peru, eastward to Amazonas, Bahia, Mattogrosso, Minas Geraes, Pará, Rio de Janeiro, and São Paulo, Brazil, and south to El Beni, La Paz, and Santa Cruz, Bolivia. It is cultivated in Haiti.

Aegiphila pendula Moldenke.

Known thus far from the Panama Canal Zone, from the State of Zulia, Venezuela, and from Bolívar, Cañar, Chimborazo, Guayas, and Santiago-Zamora, Ecuador. *E-3827.*

Aegiphila purpurascens Moldenke.

E. 4249, E. 4595, E. 5193 (TYPE). The variety is known only from Azuay.

Aegiphila schimpffii Moldenke.

An Ecuadorean species known from Bolívar, Cañar, Chimborazo, and Guayas. *E-3733, 3737.*

Citharexylum ilicifolium H.B.K.

An Andean species known from Azuay, Cañar, Chimborazo, Pichincha, and Tunguragua, Ecuador, southwards into Peru and to La Paz, Bolivia. It is cultivated in California, Massachusetts, England, and Germany. *E-422, E-1793, E-1873, E-2030, P-165.*

Citharexylum montanum var. chimborazense Moldenke.

E. 3455, TYPE. Known only from the type collection.

Cornutia microcalycina var. pulverulenta Moldenke.

Ranging from the Panama Canal Zone southward through Boyacá, Cauca, Nariño, and Valle del Cauca, Colombia, to Bolívar, Cañar, Chimborazo, Esmeraldas, Guayas, Manabi, and Pichincha, Ecuador. *E-3681.*

Duranta coriacea Hayek.

An Andean species ranging from Antioquia, Cauca, Cundinamarca, Huila, Tolima, and Valle del Cauca, Colombia, through Chimborazo and Loja, Ecuador, into Peru. *E-3209.*

Duranta dombeyana Moldenke.

An Andean species ranging from Chimborazo, El Oro, and Loja, Ecuador, to Huánuco, Junín, and Piura, Peru, but known also from Albemarle Island in the Galapagos Islands. *E-3514.*

Duranta mutisii L. f.

Most widespread of the montane species of the genus, ranging from Antioquia, Boyacá, Cundinamarca, Santander, and Valle del Cauca, Colombia, eastward to Aragua, Federal District, and Mérida, Venezuela, and southward through Azuay, Cañar, Loja, and Los Ríos, Ecuador, to Cajamarca, Peru. It is also known from Duncan Island in the Galapagos Islands. *E-1805, E-1902, E-5203, P-96.*

Hierobotana inflata (H.B.K.) Briq.

Known only from Chimborazo, Imbabura, Pichincha, and Tunguragua, Ecuador, and Arequipa and Ayacucho, Peru. *E-2427.*

Lantana moritziana Otto & Dietr.

A very widespread species ranging from Trinidad, practically the whole of Colombia, and the greater part of Venezuela and British Guiana, through El Oro, Guayas, Loja, Los Ríos, Napo-Pastaza, Pichincha, and Tunguragua, Ecuador, to eastern Peru and parts of Brazil. It is cultivated in Colombia and Germany. *E-2365.*

Lantana rugulosa H.B.K.

A rather widespread species found abundantly in Antioquia, Boyacá, Cauca, Cundinamarca, Putumayo, and Valle del Cauca, Colombia, and in Azuay, Carchi, Chimborazo, El Oro, Guayas, Loja, Pichincha, and Tunguragua, Ecuador, and south to Ayacucho, Cajamarca, Huánuco, Junín, and Lima, Peru. It is doubtful whether the plants known under this name from British Guiana and central and southern Brazil are really the same, although the plants from Cochabamba and La Paz, Bolivia, may be the same. It is cultivated in Switzerland. *E-1829, E-2364, E-2366, E-2536.*

Lantana scabiosaeflora H.B.K.

An Andean species known from Azuay, Chimborazo, Guayas, and Loja, Ecuador, and from Ancachs, Arequipa, Cajamarca, Huánuco, Libertad, Lima, and Piura, Peru. It is cultivated in Austria and Switzerland. *E-1833, E-2561, E-3040.*

Lantana trifolia L.

An extremely widespread and polymorphic lowland tropical species ranging from Cuba and Mexico through the West Indies and Central America south to Peru, Bolivia, and Tucumán, Argentina, and introduced as a weed in the Comoro and Seychelles Islands, Madagascar, India, Ceylon, Hongkong, Singapore, Sumatra, Java, and Amboina. It is widely cultivated. Most of the continental African material identified as this species is a related African species, *L. mearnsii* Moldenke. *E-3745.*

Petrea pubescens var. **klugii** Moldenke.

Known only from Santiago-Zamora, Ecuador, and San Martín, Peru. *E-1450.*

Phyla strigulosa (Mart. & Gal.) Moldenke.

A widespread species found from southern Texas and most of Mexico through Central America and from Cuba and the Dominican Republic through the West Indies to Guayas, Ecuador, Cajamarca, Libertad, and Lima, Peru, and Santa Cruz, Bolivia. *E-3549.*

Priva lappulacea (L.) Pers.

A widespread tropical species found from southern Florida and Texas through the West Indies and Central America south to eastern Peru and Bolivia; introduced in Java; widely cultivated in Europe and Java. *E-3577.*

Verbena demissa Moldenke.

E. 1851, E. 2510 (TYPE). The species is known thus far only from Azuay and Cañar.

Verbena glabrata H.B.K.

An Andean species known from Azuay, Bolívar, Cañar, Chimborazo, Pichincha, and Tunguragua, Ecuador, and Ayacucho, Cuzco, and Lima, Peru, as well as from Albemarle Island in the Galapagos Islands. *E-1746.*

Verbena litoralis H.B.K.

An extremely widely distributed and polymorphic subtropical and tropical weed ranging from Arkansas, Louisiana, and Texas throughout Central and South America; introduced in South Africa, Hawaii, Australia, and parts of Oceanica. *E-2495.*

Verbena microphylla H.B.K.

An Andean species ranging from Azuay, Chimborazo, Leon, and Tunguragua, Ecuador, and Ancachs, Ayacucho, Cuzco, Junín, Lima, and Puno, Peru, to La Paz and Oruro, Bolivia, and Catamarca, Jujuy, Los Andes, Mendoza, and Tucumán, Argentina, with a remarkable extension into Uruguay (?). *E-2425.*

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REVISION OF THE GENUS SAGITTARIA (ALISMATACEAE)[1]

CLIFFORD BOGIN

INTRODUCTION

The genus *Sagittaria* is one of approximately ten that comprise the family Alismataceae. This family is one of a series of related primitive monocotyledonous groups which include the bulk of aquatic angiosperms. The entire complex is interesting from the standpoint of phylogenetic origins and relationships, distributional patterns, ecology, and vegetative variability. The inherent diversity in leaf-shape as well as the wide distribution of *Sagittaria* has resulted in a confused taxonomy that is greatly in need of study. The frequency of the genus in eastern North America has made it a familiar sight to anyone who is interested in plants in general and aquatic plants in particular, while its various morphological responses to its environment have always been a striking feature and a source of conjecture to the writer. The opportunity to investigate the genus critically was therefore greatly welcomed. Such research could profitably be undertaken at The New York Botanical Garden since large and varied collections were on deposit there, while several indigenous species found in the vicinity could be studied during their entire growing period.

Sagittaria, or arrowhead, as here treated, consists of 20 species, mostly American, that grow in a diversity of paludal and aquatic habitats. It is predominantly a genus of swamps or quiet shallow fresh-water, but it is also found in deep waters of streams and in tidal brackish waters. While mainly a genus of the warm-temperate latitudes, several species are purely tropical in distribution, and others range nearly to the Arctic Circle.

In addition to the collections in the herbarium of The New York Botanical Garden, other principal collections of the genus were borrowed or visited. Altogether more than 8000 specimens were examined critically. Those herbaria whose collections contributed to this study are listed below with their standard abbreviations as suggested by Lanjouw & Stafleu (1952).

A—Arnold Arboretum, Cambridge, Massachusetts.
GH—Gray Herbarium of Harvard University, Cambridge, Massachusetts.
IA—State University of Iowa, Iowa City, Iowa.
K—Royal Botanic Gardens, Kew, England.
L—Rijksherbarium, Leiden, Netherlands.
LIL—Instituto Miguel Lillo, Tucumán, Argentina.
MEX—Museo Nacional de Historia Natural de México, Mexico, D. F., Mexico.
MO—Missouri Botanical Garden, St. Louis, Missouri.
NY—The New York Botanical Garden, New York, N. Y.
UC—Herbarium of the University of California, Berkeley, California.
US—United States National Herbarium, Smithsonian Institution, Washington, D. C.

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GENERIC RELATIONSHIPS

The Alismataceae are world-wide in distribution and quite varied in morphology. All the included genera are characterized by having leaves with sheathing bases; scapes with flowers in whorls, these subtended by a whorl of bracts; hypogenous apocarpous flowers; seeds without endosperm, with campylotropous embryos. The perianth is composed of two whorls of three parts each; the outer (sepals) persistent and herbaceous; the inner (petals) deciduous and white or pink.

The closest relationship exists between *Sagittaria* and *Echinodorus,* both of which are characterized by numerous, spirally arranged, 1-celled, 1-ovuled achenes on a dome-shaped receptacle. The former is predominantly temperate in distribution and has separate staminate and pistillate flowers, while the latter is mostly tropical in distribution and has perfect flowers. This distinction is somewhat weakened, however, by the presence of a ring of functional stamens on the pistillate flowers of some of the more primitive Sagittarias; while the most primitive species (*S. guyanensis*) occasionally shows signs of aborted carpels in the staminate flowers. One other character, more or less constant, serves to separate the two genera—the achenes of *Sagittaria* are much more flattened and compressed than those of *Echinodorus*.

Until recently the more primitive members of *Sagittaria* were always retained in a separate genus *Lophotocarpus.* These predominantly tropical or warm-temperate plants do show some gradations between *Echinodorus* and *Sagittaria* as discussed above; however, their mergence with the subg. *Sagittaria* is complete. The chief arguments of those who would maintain *Lophotocarpus* as a separate genus are based on the presumption that the *Lophotocarpi* are annual with staminate flowers above and perfect flowers below, while the *Sagittariae* are perennial with separate staminate and pistillate flowers. The first premise is no more than a vagary of edaphy and climate; both groups contain species that are facultatively perennial or annual according to their habitats. The second premise would seem to be a case of poor observation, since nearly all species in both groups may demonstrate perfect flowers occasionally, while, even more frequently, species of *Lophotocarpus* may have separate pistillate and staminate flowers. *Lophotocarpus* therefore cannot be maintained on a generic level. It is preserved here as a subgenus by combining with it several species of *Sagittaria* that demonstrate the same characteristics of reflexed, thickened, pistillate pedicels, appressed to spreading pistillate sepals, and occasionally perfect flowers. The reasons for not maintaining *Lophotocarpus* as a separate genus are capably reviewed by Mason (1952).

HISTORY OF THE GENUS

Linnaeus in his *Species plantarum* (1753, p. 993) established *Sagittaria* as a genus, basing the name on numerous publications of earlier writers. He included therein three species, of which only one, *S. sagittifolia*, has been retained. Of the others, *S. obtusifolia* has since been transferred to *Limnophyton*, while *S.*

triflora, with ternate leaves, gives all indications of being either a *Ranunculus* or a *Potentilla*. One other Linnaean species of 1753, *Alisma subulatum*, has been since transferred to *Sagittaria*.

Adanson (1763, 2: 459) revived a pre-Linnaean name, *Sagitta*, for the genus, which of course cannot be maintained. For the balance of the 18th century and the earlier part of the 19th century, numerous species were proposed by various authors, some of them new, but for the most part they were found, even in those days, to be synonymous with previously described ones.

Rafinesque (1825, p. 3) proposed two new genera, *Diphorea* and *Drepachnia*, for some American Sagittarias. His basis for separation (stamen numbers) is so tenuous and so variable a character, that it is useless for segregating even forms.

Kunth (1841, 3: 155-162) attempted to arrange in some orderly fashion the 27 species he included in the genus. He set up three sections, two of which were unnamed, the third, *Lophiocarpus*, was described as being closer to *Echinodorus* than to *Sagittaria*. In this section were several species which today have all been united with the pantropical *S. guyanensis*.

Lophiocarpus was raised to generic rank by Miquel (1870, p. 49-51). It included only the Asiatic species of those listed by Kunth. Micheli (1881) enlarged *Lophiocarpus* to include *S. seubertiana* (here treated as a form of *S. guyanensis* with entire-winged smooth-faced achenes) and the North American *S. calycina* (here included as a subspecies of *S. montevidensis*).

Bentham and Hooker (1883, 3(3): 1006) reduced *Lophiocarpus* to a section of *Sagittaria* and proposed *Eusagittaria* as a second section.

Durand (1888, X, 504), without passing on its merits as a genus, discovered that *Lophiocarpus* was a later homonymn of a chenopodiaceous genus, *Lophiocarpus* Turcz., and proposed the name *Michelia* as a substitute (he thought that Micheli was the original author of *Lophiocarpus*). Durand then learned that *Michelia* already had been used by Linnaeus for a genus of Magnoliaceae, and so later, in the same publication, he decided on the name *Lophotocarpus*.

Baillon (1894, 12: 70-81) not only did not recognize *Lophotocarpus* but reduced *Echinodorus* to a section of *Sagittaria*. Kuntze (1898, 3(2): 325-329), following Baillon's example, lumped the South American species of *Echinodorus* under *Sagittaria*, and also reduced all the previously recognized South American species of *Sagittaria* to varieties of *S. pugioniformis*.

J. G. Smith (1894) attempted the first thorough revision of the North American species of *Sagittaria*. He recognized 22 species, besides two species of *Lophotocarpus*. Later (1899) he revised the *Lophotocarpi* north of Mexico, proposing seven species, most of which have since been considered as edaphic variations of one or possibly two taxa.

Buchenau (1889) maintained the two genera in much the same manner as Micheli. Later (1903) he narrowed the gap between the two considerably by leaving in *Lophotocarpus* only the pantropical *S. guyanensis*. Buchenau's later work is the only thorough treatment of the Sagittarias of the world. He recognized 31 species and listed as doubtful five others, as well as maintaining *Lophotocarpus* with two species as discussed above.

Small (1909) last revised the North American members of the genus. He followed Smith's concepts and recognized 35 species of *Sagittaria* and seven of *Lophotocarpus*.

The present writer, for reasons discussed above, cannot find any basis for maintaining *Lophotocarpus* on a generic level; however, he does separate *Sagittaria* into two subgenera, *Lophotocarpus* and *Sagittaria*. This is justified on the basis of correlated morphology, relationships, and distribution as discussed below. The 20 species recognized here include 9 subspecies and 12 varieties for a total of 36 taxa.

A subspecies is differentiated from a variety in this work on the basis of fixed variations and correlated distributions. If the population concerned occupies a range essentially distinct from the balance of the species, it has been treated as a subspecies. On the other hand if it is morphologically but not geographically distinct, it has been treated as a variety.

MORPHOLOGICAL CONSIDERATIONS

Taxonomic investigation of a common, frequently collected genus such as *Sagittaria* offers ample opportunity for study of variations in populations. This study illustrates the point that the number of proposed taxa of variable organisms may vary inversely with the frequency of collections. That is, there is a tendency for infrequently collected plants found in widely scattered areas to appear distinct until such times as collected intermediates show them to be no more than the extremes of a variable population.

In order to avoid the possibility of consciously or unconsciously setting up preconceived values for the various characters observed, each specimen was examined and analyzed in detail without attempting to force it into any taxon. These analyses were recorded on individual work-sheets and only after more than 2000 specimens were examined was any attempt made to separate them into groups. In this manner it soon became apparent that certain characteristics were completely useless in themselves to segregate the various taxa. Even those that were useful could not in themselves, except in rare cases, safely identify a plant. Only after the author had correlated several different morphological characters with both distribution and habitat did the chaos of variability gain a semblance of order.

With the framework thus laid down, each new specimen that was examined and analyzed helped to complete the generic and specific structure by filling in missing gaps or extending the over-all picture.

The following survey reviews the morphological variation and attempts to assess its value in the taxonomy of the genus.

Habit. The entire genus is herbaceous. Most species are perennial; the few individuals that seem annual probably represent ecological responses of warm-temperate species to a colder climate and a shorter growing season. Perennation is by rhizomes, runners, and corms. The rhizome is mostly short and thick, usually producing a single crown of leaves each growing season; very rarely however, leaves are produced along its entire length. The runners or stolons are extensive noded branches that generally terminate in a leafy bud. These buds can successfully winter over, or, more frequently and depending on climatic conditions, immediately form another plant. In temperate areas many species develop winter storage organs instead of buds on the stolon. These storage organs develop from the last two internodes of a runner (Arber 1920, p. 15). They do not exactly fit the accepted definitions of any of the standard names for storage organs and have been called bulbs, tubers, and corms by different authors. Following Mason (1952), the author has considered them to be corms.

Leaves. These organs are in every respect the most variable structures of the genus. All have sheathing, cellular petioles. Depending on edaphy these leaves may grow submerged, floating, or emersed. The type of leaf is a response to the depth of the water in which they begin growing; however, it seems that once a leaf does respond to a given depth of water in its initial growth, there can be no further response in that particular leaf no matter how its environment changes. Submerged leaves are always bladeless and are considered phyllodia. They may be strap-shaped or terete, and their presence and shape are often useful tools in identifying plants (i.e., the spongy, terete phyllodia of *S. graminea* var. *teres*). In tidal forms such as *S. montevidensis* subsp. *spongiosa* the phyllodia often have somewhat broadened or spatulate ends. The floating leaves regularly form linear to ovate blades with bases occasionally cordate. The floating cordate blades of *S. cuneata*, when present, and of *S. guyanensis* are nearly certain guides to the identity of these species. The emersed leaves have linear to ovate blades which may be variously sagittate. These, in correlation with other factors, while almost never of specific value, are useful for delimiting various groups of species. The one exception is *S. longiloba*, easily recognized by the basal lobes of the sagittate leaves which are always longer than, and mostly twice as long as, the blade. The venation of the leaves has often served as a key characteristic for many authors; however, it is a most variable factor that is rarely satisfactory for identification except in the sagittate species of the subgenus *Lophotocarpus* (*S. sprucei*, *S. montevidensis* and *S. intermedia*), which have characteristic prominent-veined leaves.

Much discussion and speculation have centered on which of the various leaf-forms are primitive. Arber (1920, p. 22, 23) reviews this thoroughly and concludes that the phyllodial leaves, which are always the first formed no matter what the environment, are primitive, while the sagittate are advanced.

Pubescence. The presence of pubescence on vegetative parts has been reported in only two taxa, *S. guyanensis* and *S. latifolia* var. *pubescens*. Its presence is therefore diagnostic. Various floral parts may be pubescent, such as bracts, sepals, and filaments. The significance of pubescence on these parts is discussed below.

Inflorescence. The scapes of *Sagittaria* are emersed and erect or lax and floating. They rarely furnish a key to specific identity although many works stress the ratio between leaf- and scape-length as an important feature. The exception is the unique geniculate scape of *S. rigida*. The *Sagittaria* inflorescence is an interrupted spike with 1–12 whorls of flowers. Occasionally the lower flower-whorls are replaced by branches and the scape has a panicled appearance.

The whorls are typically, although not always, 3-flowered, and each whorl is almost always subtended by a ring of 3 bracts. These bracts have been neglected by most workers in the genus, but the present writer has found extremely useful characters in them to distinguish taxa of all grades. Their texture (membranous or firm), indument (glabrous, pubescent), corrugations (papillose, striate), degree of basal fusion (free, joined, or connate), size, and shape are often the only sure guides to identity in the absence of mature achenes and workable stamens.

The pedicels also offer useful characters. They may be ascending, divaricate, or recurved, and variously thickened. Those of the pistillate flowers in combination with certain characteristics of the sepals furnish the basis for the separation of the genus into two rather well-marked subgenera (figs. 2e, 17d).

Flowers. The flowers of *Sagittaria* are usually unisexual with the staminate above and the pistillate below on the same scape. Individuals of several species may occasionally be unisexual but monoecious plants are the rule. Hermaphrodite flowers occasionally occur, sporadically in most species but characteristically in some species of the subgenus *Lophotocarpus.* These perfect flowers are signalized by a ring of more or less functional stamens in an otherwise pistillate flower. The appearance of functional pistils in staminate flowers has never been reported although aborted pistils appear sporadically in the staminate flowers of several species. Flowers are produced throughout the growing season.

The three sepals are herbaceous and persistent. They are often characteristically adorned with papillosities, pubescence, and striae. Those of the staminate flower are reflexed, while those of the pistillate flower are reflexed in the subgenus *Sagittarie* (fig. 17d) and spreading or appressed in the subgenus *Lophotocarpus* (fig. 2e).

The three white or rarely pink petals are deciduous and occasionally have a purple spot at their base. They are often quite showy, averaging about twice the size of the sepals. In several species flowers are double through the replacement of stamens by additional petals (*S. latifolia*, *S. sagittifolia*).

The whorled stamens vary from seven to numerous. Their filaments are important diagnostically in shape, size, and indument. They may be either linear, subulate, or dilated, and glabrous or pubescent. The bilocular, basifixed anthers vary in shape from linear to nearly orbicular. The pollen grains are yellow, nearly spherical, ca. .02 mm in diameter with somewhat pitted walls (Buchenau 1903, p. 7). The numerous pistils are free, hypogynous, 1-celled, 1-ovuled, and spirally arranged on a dome-shaped receptacle. Each has a terminal style that varies remarkably little throughout the genus and proves quite useless in specific determination. The ovules are anatropous. Pollination is accomplished largely by insects attracted by the ephemeral petals, although foraging snails probably play a small part, at least in some species.

Fruit. Each pistil matures into a most characteristic achene which furnishes the surest means of specific identification. Among the diagnostic characters to be sought are the size, shape, and insertion of the achene-beak; the size, number, and shape of the facial wings, if present; the presence or absence of resin-ducts; the size and shape of the dorsal wings; and the general shape and size of the achene itself. Externally all have a fine cellular-reticulate appearance that is insensibly lost at or near maturity. The seed is without endosperm; the embryo is horseshoe-shaped. The achenes are retained on the receptacle until maturity and are then water-dispersed. The resin-ducts and various wings of the achenes are reported to be a buoyancy factor in water-dispersal (Buchenau 1903, p. 8).

It should be noted that all descriptions and measurements used in this paper are based on dried specimens, except for the stamens, which were restored by boiling.

CYTOLOGY

The literature has scattered references to chromosome counts of the genus. The most comprehensive lists are those of Brown (1947) and Delay (1951). A table of taxa follows with their reported chromosome numbers and the earliest authority for each. Using the abundant fresh material available in the New York area and fixed material from more remote places, the writer was able to verify these counts in most of the species he examined. The counts verified or determined by the writer are marked with an asterisk. Anther smears stained with propionocarmine were used to determine the haploid number, while squashes of young, active root-tips, similarly stained, were the source of the diploid number.

Chromosome numbers in Sagittaria

Taxa	*n*	*2n*
S. cuneata (as S. arifolia)	11*	22* (Brown 1947)
S. engelmanniana		
subsp. *engelmanniana*		22 (Brown 1947)
subsp. *longirostra* (as *S. longirostra*)		22 (Brown 1947)
S. graminea var. *graminea*	11*	22* (Brown 1947)
var. *teres* (as *S. teres*)		22 (Brown 1947)
var. *weatherbiana* (as *S. weatherbiana*)		22 (Brown 1947)
S. lancifolia		
subsp. *lancifolia*		22 (Brown 1947)
subsp. *media* (as *S. falcata*)		22 (Brown 1947)
S. latifolia var. *latifolia*	11* (Oleson, 1941)	22* (Oleson 1941)
var. *pubescens* (as *S. pubescens*)	11*	22* (Brown 1947)
S. montevidensis		
subsp. *montevidensis*		ca. 20 (Taylor 1925)
S. rigida	11*	22* (Oleson 1941)
S. sagittifolia		22 (Lohammer 1931) 16 (Liehr 1916)
S. aginashi	11	22 (Shinke 1929)
S. natans		22 (Lohammer 1931)
S. trifolia var. *sinensis*		22 (Morinaga and Fukushima 1931) 20 (Nawa 1928)
S. subulata var. *gracillima*		ca. 44*
var. *kurziana* (as *S. Kurziana*)		22 (Brown 1947)
var. *subulata*	11*	22* (Brown 1947)

Cytological work is still far from complete, for 20 of the 36 taxa here maintained have not as yet been investigated. On the basis of the known counts it may be stated that in *Sagittaria* polyploidy or aneuploidy do not seem to play any considerable role in speciation.

DEVELOPMENTAL TRENDS

The relationships between species of *Sagittaria* are discussed in greater detail in the systematic treatment that follows; however, the developmental trends within the genus present an interesting correlation with their geographic distribution.

Any phylogenetic discussion is at best speculative. Nevertheless, the vast amount of material examined by the writer and his final disposition of taxa lead inevitably to some conclusions, which, while they cannot be absolutely verified, seem correct and follow the accepted dicta of plant geography. In the course of this investigation it was noted that the genus can be separated more or less naturally into two subgenera. The subgenus *Lophotocarpus*, predominantly tropical and warm-temperate in distribution, is characterized by pistillate flowers on recurved thickened pedicels and with appressed to spreading sepals, besides having some species characteristically with perfect flowers in the lower whorls. The subgenus *Sagittaria*, predominantly north-temperate in distribution, is characterized by pistillate flowers on ascending, non-thickened pedicels and with sepals reflexed, while the presence of perfect flowers is sporadic. Interestingly enough, in both subgenera the species with intermediate characteristics occupy intermediate geographical ranges.

On the basis of the morphological (perfect vs. imperfect flowers) and distributional (tropical vs. temperate) evidence presented above, it is reasonable to assume that the subgenus *Lophotocarpus* is more primitive than the subgenus *Sagittaria.* A diagrammatic chart has been prepared (fig. 1) that suggests the supposed relationships of the species of *Sagittaria* as well as their correlated geographic distribution. It is the writer's belief that *Sagittaria* and *Echinodorus* are closely related, with *Echinodorus* the more primitive genus, as demonstrated by its perfect flowers and more tropical distribution. *S. guyanensis*, a pantropical non-plastic primitive species, is probably somewhat intermediate between these genera. The widespread plastic and primitive New World *S. montevidensis* has probably changed but little from the ancestral prototype that gave rise to the remainder of the genus. This species and all of the purely tropical *Lophotocarpi* have appressed sepals and mostly perfect flowers in the lower whorls. The warm-north-temperate *Lophotocarpi* have the sepals spread and only rarely have perfect flowers. Apparently not all of the *Sagittariae* have the same origin. Those characterized by pubescent filaments and non-sagittate leaves (*S. graminea* and allies) appear to be more directly related to the *Lophotocarpi.* They are generally more tropical in distribution than the other *Sagittariae* and *S. graminea* is sufficiently close to *S. montevidensis* to have probably hybridized with that species. *S. papillosa* and *S. ambigua* are allied to the *S. graminea* group, and are separated from it only by the loss of pubescence on the filaments. The anomalous *S. macrophylla* occupies a position intermediate between the balance of the *Sagittariae* and the *Lophotocarpi.* The remainder of the subgenus with glabrous filaments is further

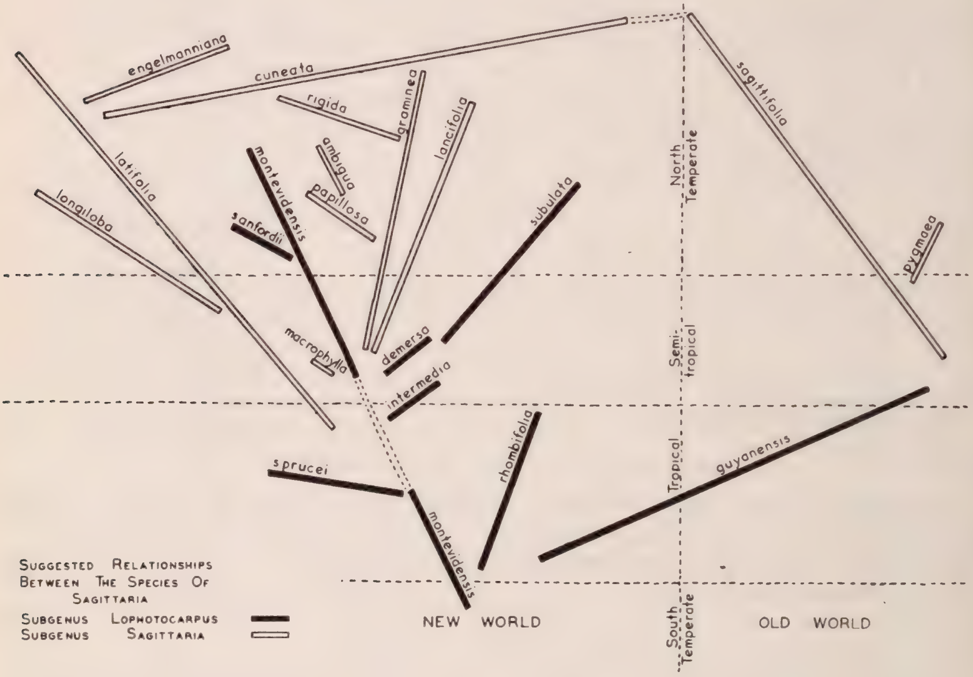
engelmanniana
cuneata
rigida
graminea
lancifolia
ambigua
papillosa
montevidensis
sanfordii
latifolia
longiloba
subulata
sagittifolia
North Temperate
pygmaea
Semi-tropical
macrophylla
demersa
intermedia
rhombifolia
sprucei
Tropical
guyanensis
montevidensis
Suggested Relationships Between The Species Of Sagittaria
Subgenus Lophotocarpus
Subgenus Sagittaria
NEW WORLD
South Temperate
OLD WORLD

FIGURE 1.

removed, with north-temperate distribution and typically sagittate emersed leaves. The most northern species, *S. cuneata* and *S. sagittifolia*, are closely related and form a circumboreal complex. *S. pygmaea* is an Asiatic phyllodial species that probably evolved from *S. sagittifolia*.

ECONOMIC IMPORTANCE

The winter storage organs of some of the sagittate *Sagittariae* are edible. The Old World *S. sagittifolia* is commonly found in rice-paddies, and while not often cultivated, it is encouraged and forms a secondarily valuable food plant (Porterfield 1940). The New World *S. latifolia* and *S. cuneata* were formerly sought by Indians and early settlers for food. They are apparently used today only by some naturalized Chinese and Japanese. Folk-lore ascribed some curative properties to various species, but the genus has no use in present day medicine. *S. subulata* is a useful aerator and ornamental in aquaria. Several other species are occasionally in limited cultivation as ornamentals.

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SYSTEMATIC TREATMENT

Sagittaria L. Sp. Pl. 993. 1753.

Paludal or aquatic, mostly perennial, stoloniferous herbs with milky latex. Leaves emersed, floating, or submerged, with sheathing, cellular petioles, the emersed with distinct, often sagittate blades, the floating frequently with unlobed or cordate blades, the submerged without blades (i.e. phyllodia). Plants mostly monoecious, rarely dioecious. Scape erect or lax, with 1–12 mostly 3-flowered whorls, each of these subtended by a whorl of 3 bracts, occasionally with branches replacing the lower flower-whorls. Flowers mostly unisexual, with staminate above and pistillate below, the latter occasionally with a ring of functional or non-functional stamens. Pedicels ascending or divaricate, the pistillate often thickened and recurved in fruit. Sepals three, herbaceous, persistent, those of the staminate flowers reflexed, those of the pistillate in fruit appressed, spreading, or reflexed. Petals three, deciduous, white or rarely pink, occasionally with a purple spot at the base. Stamens whorled, mostly numerous, with linear, subulate, or dilated filaments and bilocular, nearly basifixed anthers. Carpels numerous, distinct, 1-celled, 1-ovuled, spirally arranged in a crowded, mostly spherical head on a dome-shaped receptacle; achenes flattened, winged, beaked, mostly membranaceous, with erect, campylotropous seeds.

Type: *Sagittaria sagittifolia* L. Sp. Pl. 993. 1753.

Key to the Subgenera and Species of Sagittaria

1. Pistillate flowers with sepals appressed or spreading, their pedicels recurved and thickened in fruit; a ring of functional stamens occasionally present. Mostly tropical, occasionally warm-temperate. Subg. 1. *Lophotocarpus*.
  2. Sepals closely appressed to the pistillate flowers, these often perfect. Tropical except for no. 4.
    3. Bracts more or less thickened, at least some of them appressed to the scape; leaves never sagittate.
      4. Leaf-blades typically emersed, without lobes, thickish; achenes narrow-winged, entire. South America. 1. *S. rhombifolia*.
      4. Leaf-blades floating, cordate, thin; achenes typically crenate-winged. Pantropical 2. *S. guyanensis*.
    3. Bracts more or less membranous (if thickish then south-temperate in distribution); leaves typically sagittate.
      5. Scape constricted at the whorls; achenes 4 mm or more long; pistillate flowers subsessile. Amazon basin. 3. *S. sprucei*.
      5. Scape not constricted; achenes smaller; pistillate flowers obviously stalked. Warm-temperate, New World, if tropical not in lowlands. 4. *S. montevidensis*.
  2. Sepals only loosely appressed to or spreading from the pistillate flowers, these only rarely perfect. New World warm-temperate and semi-tropical northern latitudes.
    6. Pistillate pedicels thickened and fleshy. Semi-tropical (no. 5, California).
      7. Leaves typically emersed with distinct blades; achene-beaks thick-based, short.
        8. Leaves never sagittate; achenes plain. California. 5. *S. sanfordii*.
        8. Leaves typically sagittate; achenes tuberculate. West Indies, Colombia. 6. *S. intermedia*.
      7. Leaves submerged, phyllodial; achene-beak filiform. Mexico. 7. *S. demersa*.
    6. Pistillate pedicels scarcely thickened. Atlantic coastal plain, United States. 8. *S. subulata*.
1. Pistillate flowers with reflexed sepals, their pedicels typically ascending (at length recurved but not markedly thickened in nos. 10b and 14); perfect flowers rarely present. Mostly north-temperate, occasionally extending to the tropics. Subg. 2. *Sagittaria*.

9. Filaments pubescent; leaves typically non-sagittate. Eastern North America (no. 11 extending to South America).
10. Bracts more or less connate and membranous; filaments dilated or subulate.
11. Pistillate flowers subsessile or nearly so; scape geniculate at the lowest whorl; achene-beak 0.8 mm or more long; filaments subulate. 9. *S. rigida.*
11. Pistillate flowers obviously stalked; scape erect; achene-beak shorter; filaments dilated. 10. *S. graminea.*
10. Bracts thickened, papillose or ridged, nearly free; filaments linear. 11. *S. lancifolia.*
9. Filaments glabrous; leaves typically sagittate (except nos. 12, 13 and 20). North-temperate (no. 14 Mexican, nos. 15 and 19 extending to the tropics).
12. Plants of the New World.
13. Bracts more or less papillose; leaves never sagittate. Southern plains states.
14. Bracts densely papillose, 7 mm or less long, obtuse; achenes 1.5 mm or less long. Arkansas, Louisiana, Texas. 12. *S. papillosa.*
14. Bracts sparsely papillose, longer, attenuate; achenes larger. Kansas, Missouri, Oklahoma. 13. *S. ambigua.*
13. Bracts glabrous (if pubescent, the leaves sagittate); leaves typically sagittate.
15. Pistillate pedicels greatly elongate, 5 cm or more long, at length recurved; flower-whorls remote (the internodes long). Mexico. 14. *S. macrophylla.*
15. Pistillate pedicels shorter, ascending; flower-whorls not remote.
16. Achene-beak laterally inserted.
17. Bracts boat-shaped, obtuse or acute, more or less firm, occasionally pubescent; beak 0.5 mm or more long. Widespread. 15. *S. latifolia.*
17. Bracts attenuate, more or less membranous, never pubescent; beak shorter. Mexico, southern United States. 16. *S. longiloba.*
16. Achene-beak apically insetred.
18. Beak recurving, 0.5 mm or longer; achene-faces typically winged. Eastern United States. 17. *S. engelmanniana.*
18. Beak erect, shorter; achene-faces plain or with resin-duct. Northern North America, Rocky Mountains. 18. *S. cuneata.*
12. Plants of the Old World.
19. Pistillate flowers on ascending pedicels; achenes entire-winged; beak erect. Eurasia. 19. *S. sagittifolia.*
19. Pistillate flowers sessile; achenes toothed-winged; beak lateral. Asia. 20. *S. pygmaea.*

Subgenus 1. Lophotocarpus (T. Dur.) Bogin, comb. nov.

Sagittaria sect. *Lophiocarpus* Kunth, Enum. Pl. 3: 161. 1841.
Lophiocarpus Miq. Ill. Fl. Arch. Ind. 50. 1870. Non *Lophiocarpus* Turcz.
Lophotocarpus T. Dur. Ind. Gen. Phan. x. 1888.
Michelia T. Dur. Ind. Gen. Phan. 504. 1886. Non *Michelia* L.

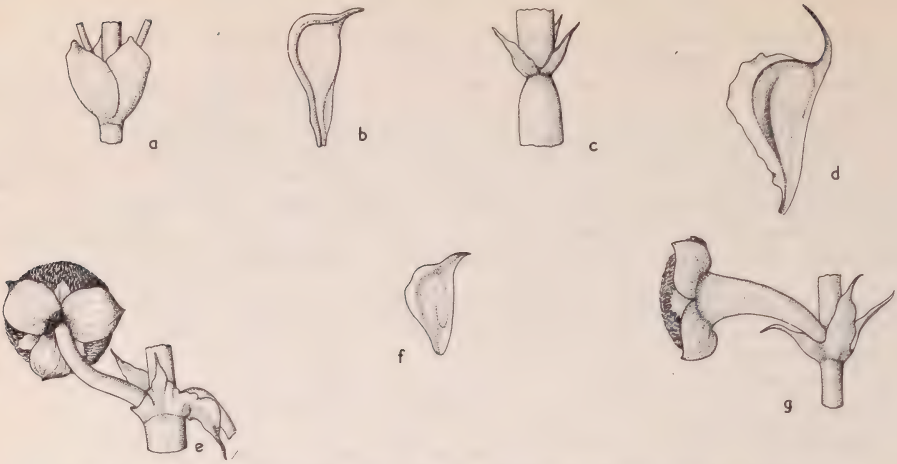
Mature pistillate flowers with appressed to spreading sepals, their pedicels recurved, more or less thickened. Perfect flowers occasionally present. (Species 1–8.)

Type species: *Sagittaria guyanensis* H.B.K. Nov. Gen. & Sp. 1: 250. 1815.

Distribution: Tropical and warm-temperate. Completely New World except for one pantropical species (*S. guyanensis*). A portion of another species is south-temperate in distribution (*S. montevidensis*); all the remainder are tropical or warm north-temperate.

Type species: *Sagittaria sagittifolia* L. (which is also the type of the genus).

Distribution: Essentially north-temperate New World. Two species, *S. sagittifolia* and *S. pygmaea*, are Old World, with the former extending into the tropics.


a
b
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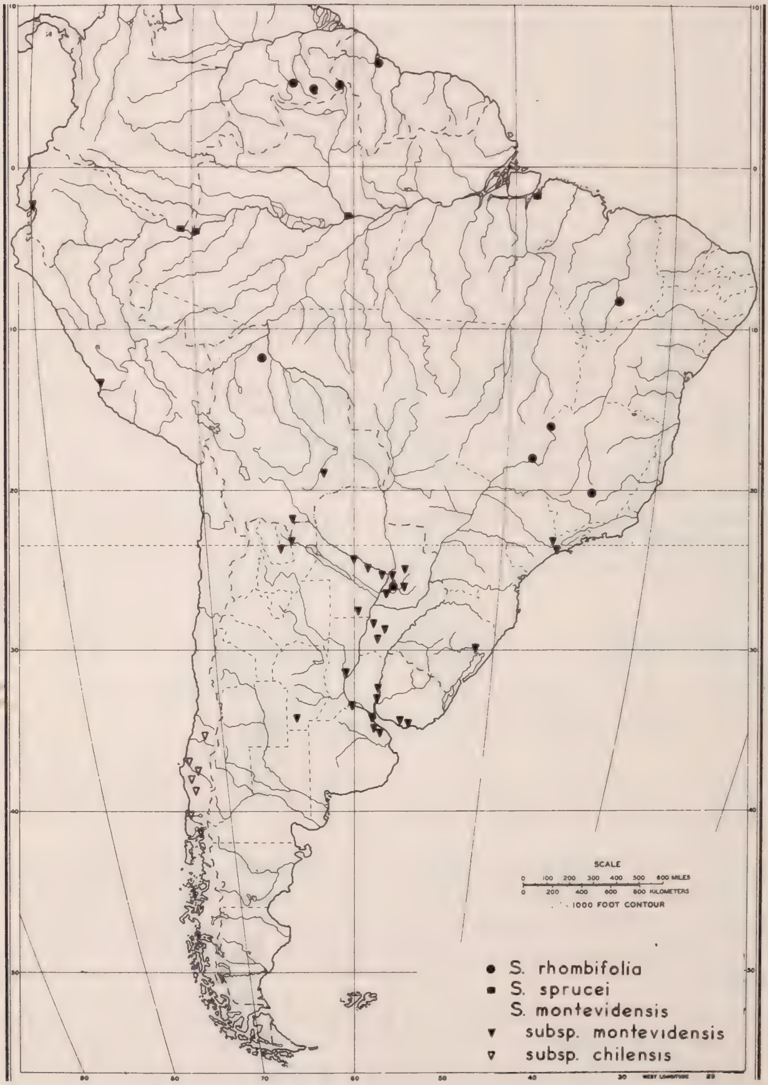

SCALE
0 100 200 300 400 500 800 MILES
0 200 400 600 800 KILOMETERS
1000 FOOT CONTOUR
● S. rhombifolia
■ S. sprucei
S. montevidensis
▼ subsp. montevidensis
▽ subsp. chilensis
90
80
70
60
50
40
30
WEST LONGITUDE
20
10
0
10
20
30
40
50

2

Of the New World species, four cross the Tropic of Cancer (*S. latifolia*, *S. lancifolia*, *S. graminea*, *S. longiloba*), while one other (*S. macrophylla*) may be classified as semitropical.

1. Sagittaria rhombifolia Cham. Linnaea 10: 219. 1835.

Sagittaria affinis Seub. in Mart. Fl. Bras. 3(1): 111. 1847.
Sagittaria lagoensis Seub. & Warm. Vidensk. Meddel. Naturh. Foren. Kjoeb. 1872: 113. 1872.
Sagittaria rhomboidalis Micheli in DC. Monogr. Phan. 3: 66. 1881. Error for *rhombifolia*.
Sagittaria pugioniformis var. *platyphylla* Micheli in DC. Monogr. Phan. 3: 78. 1881.
Sagittaria pugioniformis var. *affinis* (Seub.) Kuntze, Rev. Gen. 3: 328. 1898.
Sagittaria pugioniformis var. *rhombifolia* (Cham.) Kuntze, Rev. Gen. 3: 328. 1898.
Sagittaria amazonica Huber, Bol. Mus. Goeldi 5: 314. 1909.
Sagittaria cordifolia Suess. & Beyerle, Repert. Sp. Nov. 39: 17. 1935.
Sagittaria pugioniformis Auct. non L.

Perennial with horizontal rhizome. Leaves typically emersed, occasionally submerged or floating, with linear to ovate blades 8–25 × 0.5–6 cm, the infrequent floating blades cordate, the petioles 15–90 cm long or longer. Scapes simple, 20–90 cm long, with 3–10 whorls of flowers. Bracts large, 1.2–3 × 0.4–0.9 cm, thickened, connate at the base, attenuate, those of the upper whorls somewhat overlapping and appressed to scape. Pistillate flowers with pedicels strongly recurved, markedly thickened, 1.5–4 cm long, occasionally with a ring of functional stamens; sepals 1–2 × 1–2.5 cm, closely appressed to the receptacle at maturity; petals 1.5–2.5 × 1–2 cm, all white or with a purple spot at the base. Staminate flowers with pedicels filiform, divaricate, 2.5–8 cm long; stamens numerous, the filaments linear, glabrous to minutely glandular-pubescent, 2–3 mm long, the oblong anthers only 0.5–1.2 mm long. Mature pistillate heads 1.5–2.5 cm in diameter; achenes large 2.5–5.5 × 1.3–2.5 mm, very narrowly winged, obovate, abruptly tapering to a slender base, the faces unadorned, the beak 0.5–1 mm long, horizontally or obliquely inserted. (FIG. 2a, b.)

Type collection: *Sellow s.n.*, Brazil (holotype not seen, presumably at Berlin; isotype K).

Distribution: Lowlands of tropical South America. Collections examined from Bolivia, British Guiana, Brazil, Colombia, Paraguay, Venezuela. (FIG. 2.)

A widespread but seldom collected tropical species of shallow waters of lakes, swamps, and quiet waterways. The wide variation in leaf outline is seemingly the only basis for the proposed synonyms. The thickened, recurved pedicels, the closely appressed sepals, the occasional rings of functional stamens in the pistillate flowers, and the purely tropical distribution serve to relate *S. rhombifolia* most closely with *S. montevidensis* and *S. guyanensis*. The species superficially resembles *S. montevidensis* subsp. *chilensis*; however, the overlapping, appressed bracts, the large, unadorned achenes, the non-sagittate leaves and the geographical distribution are all quite distinct.

All authors since Linnaeus have ascribed this species to *S. pugioniformis* L. Close examination of a photograph of the Linnaean type specimen of *S. pugioniformis* shows that it has no relation to *S. rhombifolia* except for the similarly narrowed leaves. The Linnaean type is obviously the narrow-leaves form of *S. lancifolia* L. (*S. angustifolia* Lindl.), showing the typical reflexed sepals and ascending pedicels of the pistillate flowers of the subgenus *Sagittaria*.

Explanation of Figure 2

FIG. 2. Distribution of some South American species of *Sagittaria*. a, b, *S. rhombifolia*. a, bracts, × ⅔. b, achene, × 3. c, d, *S. sprucei*. c, bracts, × ⅔. d, achene, × 3. e, f, *S. montevidensis* subsp. *montevidensis*. e, bracts and pistillate flower, × ⅔. f, achene, × 3. g. bracts and pistillate flower of *S. montevidensis* subsp. *chilensis*, × ⅓.

2. Sagittaria guyanensis H.B.K. Nov. Gen. & Sp. 1: 250. 1815.

Perennial. Leaves floating or submerged, usually floating with cordate, obtuse blades 1.2–6.5 × 1–7.5 cm, their basal lobes 1–3.5 × 1–3 cm, the rare submerged leaves modified into phyllodia 3–5 × 0.5–1.0 cm, the petioles lax, 10–40 cm long. Scapes simple, 12–40 cm long, with 2–5 whorls of submerged or floating flowers. Bracts connate at the base, 0.6–2 × 0.3–0.8 cm, only slightly thickened, appressed to the scape. Plant glabrous or sparsely to thickly pubescent. Pistillate flowers with thickened and recurved pedicels 1.5–4.0 cm long, typically with a ring of 6–9 functional stamens; sepals triangular, 1–1.5 × 1–1.5 cm, closely appressed to the receptacle at maturity; petals white, oblong, about the same size or slightly longer than the sepals. Staminate flowers with divaricate and somewhat filiform pedicels 2–5 cm long; stamens 9–12, the filaments linear, glandular to glabrous, 1.8–2.3 mm long, the ovate anthers 0.8–1.1 × 0.5–0.7 mm. Mature pistillate heads 1.2 cm in diameter; achenes 1.5–3.5 × 1.3–3 mm, their wings typically crested, the cresting occasionally reduced or obsolete, the faces typically echinate-winged or -ribbed, occasionally unadorned, the beak 0.3–0.8 mm long, occasionally obsolete, laterally to obliquely inserted.

1. Mature achenes plump, small, less than 2.5 mm long. New World. 2a. subsp. *guyanensis*.
1. Mature achenes compressed, large, more than 2.5 mm long. Old World. 2b. subsp. *lappula*.

2a. Sagittaria guyanensis subsp. **guyanensis.**

Sagittaria echinocarpa Mart. Amoen. Bot. Monac. 6. 1829.
Alisma ancile Mart. ex Steud. Nom. ed. 2. 1: 49. 1840. Nomen nudum.
Sagittaria bracteata Willd. ex Kunth, Enum. Pl. 3: 161. 1841. Nomen nudum.
Alisma echinocarpum (Mart.) Seub. in Mart. Fl. Bras. 3(1): 105. 1847.
Sagittaria seubertiana Mart. Fl. Bras. 3(1): 110. 1847.
Echinodorus guyanensis (H.B.K.) Griseb. Fl. Brit. W. Ind. 505. 1864. (as *guianensis*.)
Lophiocarpus guyanensis (H.B.K.) Micheli in DC. Monogr. Phan. 3: 62. 1881.
Lophiocarpus seubertianus (Mart.) Micheli in DC. Monogr. Phan. 3: 64. 1881.
Lophotocarpus guyanensis (H.B.K.) J.G.Sm. Missouri Bot. Gard. Rep. 6: 35. 1895.
Lophotocarpus guyanensis var. *echinocarpus* (Mart.) Buch. Pflanzenreich 4(15): 36. 1903.
Lophotocarpus guyanensis var. *typicus* Buch. Pflanzenreich 4(15): 36. 1903.
Lophotocarpus seubertianus (Mart.) Buch. Pflanzenreich 4(15): 36. 1903.

Achenes plump, 1.5–2.3 × 1.3–2 mm, the wings shallowly crested, occasionally smooth, the faces 1–3 winged, typically strongly echinate, occasionally smooth or unadorned. (FIG. 5a, b.)

Type collection: *Humboldt s.n.* "In swamps, Province of Guiana near the Monastery of Don Felix Farreras and the city of Angostura," Colombia (holotype presumably at Berlin, not seen, frag. of holotype MO).

Distribution: Throughout tropical America, except in the higher mountains. Collections examined from North America: Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Panama; from South America: Argentina, Bolivia, Brazil, British Guiana, Colombia, Dutch Guiana, Ecuador, Paraguay, Peru. (Fig. 5.)

2b. Sagittaria guyanensis subsp. **lappula** (D. Don) Bogin, comb. nov.

Sagittaria triflora Noronha, Verh. Bat. Genootsch. 5, Rel. Pl. Jav. 26. 1790. Nomen nudum.
Sagittaria lappula D. Don, Prodr. Fl. Nep. 22. 1825.
Alisma lappula Ham. ex D. Don, Prodr. Fl. Nep. 22. 1825. Nomen nudum.
Sagittaria pusilla Blume, Enum. Pl. Jav. 34. 1827.
Alisma hamiltonianum Wall. Cat. 175. 1828. Nomen nudum.
Alisma pubescens Ham. ex Wall. Cat. 175. 1828. Nomen nudum.
Alisma stellatum Ham. ex Wall. Cat. 175. 1828. Nomen nudum.

Sagittaria cordifolia Roxb. Fl. Ind. 3: 647. 1832.
Sagittaria nymphaeifolia Hochst. ex Steud. Nom. ed. 2. 2: 491. 1840. Nomen nudum.
Sagittaria blumei Kunth, Enum, Pl. 3: 158. 1841.
Sagittaria obtusissima Hassk. Cat. Pl. Hort. Bog. 26. 1844.
Lophiocarpus cordifolius (Roxb.) Miq. Ill. Fl. Arch. Ind. 2: 50. 1870.
Lophiocarpus lappula (D. Don) Miq. Ill. Fl. Arch. Ind. 2: 50. 1870.
Lophiocarpus cordifolius var. *madagascariensis* Buch. Abh. Nat. Ver. Brem. 7: 30. 1880.
Sagittaria parviflora Wall. ex Micheli in DC. Monogr. Phan. 3: 62. 1881. Nomen nudum.
Lophotocarpus guyanensis var. *lappula* (D. Don) Buch. Pflanzenreich 4(15): 36. 1903.
Lophotocarpus guyanensis var. *madagascariensis* Buch. Pflanzenreich 4(15): 36. 1903.
Lophotocarpus formosanus Hayata, Ic. Pl. Formos. 5: 249. 1915.

Achenes compressed, 2.5–3.5 × 1.8–3 mm, the wings typically deeply crested, rarely nearly smooth, their faces usually prominently 1-ribbed, the rib occasionally remotely echinate, rarely unadorned. (FIG. 5c.)

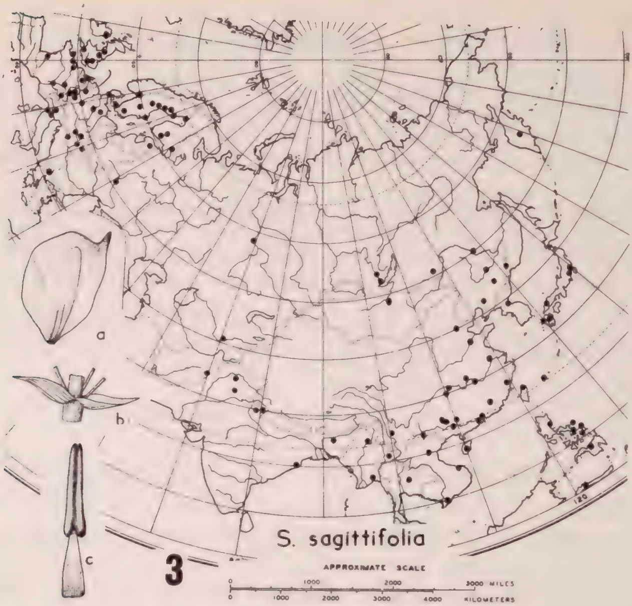
Type collection: *Hamilton s.n.*, Nepal (holotype thought to be at Edinburgh, not found).

Distribution: Old World tropics, absent in Australia and Oceania. Collections examined from Africa: Anglo-Egyptian Sudan, Madagascar, Nigeria; from Asia: Burma, China, Formosa, Hong Kong, India, Indo-China, Java, Malaya, Pakistan, Siam. It has also been reported in the other East Indian Islands associated with the Asiatic flora. It is, however, absent from the Philippines and Ceylon. (Fig. 5.)

A widespread, pantropical species of lakes, swamps, and the nearly stagnant waters of streams. The most common *Sagittaria* of the tropics, with cordate leaf-blades always floating, never emersed. The flowers are produced under water, but typically are found floating at or near the surface.

The remarkable and almost unique pantropical distribution may be correlated with the obviously primitive features of the species. In floral structure, it is nearly intermediate between *Sagittaria* and *Echinodorus*. The pistillate flowers regularly bear a ring of 6–9 functional stamens and the staminate flowers usually show remnants of aborted pistils. Many authors have based the maintenance of this species in the separate genus *Lophotocarpus* on these characteristics. The recurved, thickened pedicels and the appressed sepals of the mature pistillate flowers show the close relationship of *Sagittaria guyanensis* with *S. montevidensis* and *S. rhombifolia*. Its achenes and leaf-shape are quite distinctive.

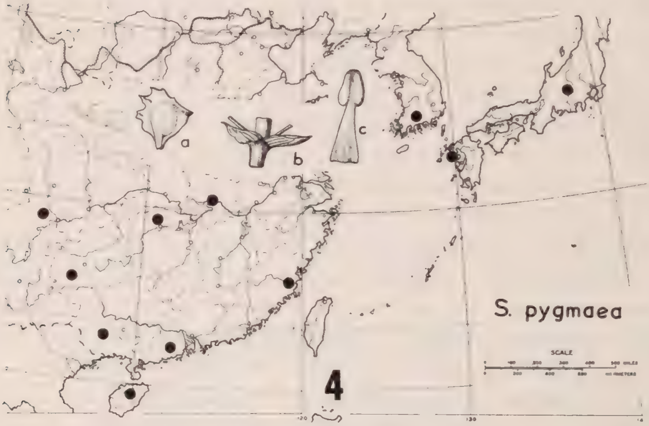
As a member of a genus whose species are characterized by wide variation in leaf-shape, *S. guyanensis* is, oddly enough, extremely constant in leaf-form. This constancy is even more remarkable in the light of its wide distribution. Vegetatively and florally, there is absolutely no basis for separating this taxon into different species. The present treatment, with division into two subspecies, is justified on the basis of achene characteristics and correlated geographical distribution. The Old World plant is characterized by a uniformly larger achene, flattened in cross section, with deeply crested wings and relatively little facial adornment (*S. lappula* D. Don). It must be noted, however, that in some Madagascan plants the achene is reduced in size and the cresting nearly absent (var. *madagascariensis* Buch.). The New World subspecies has an achene plump in cross section, uniformly smaller in size, with the wings typically shallowly crested and the faces markedly echinate (*S. echinocarpa* Mart.). Some northern South American plants have achenes without facial adornment (var. *typicus* Buch.), a trend resulting finally in a completely unadorned achene without even wing-cresting (*S. seubertiana* Mart.). The extensive synonymy has resulted from the wide geographical range, the confusion in deciding on generic characteristics, and the variation in the achenes.



3

S. sagittifolia

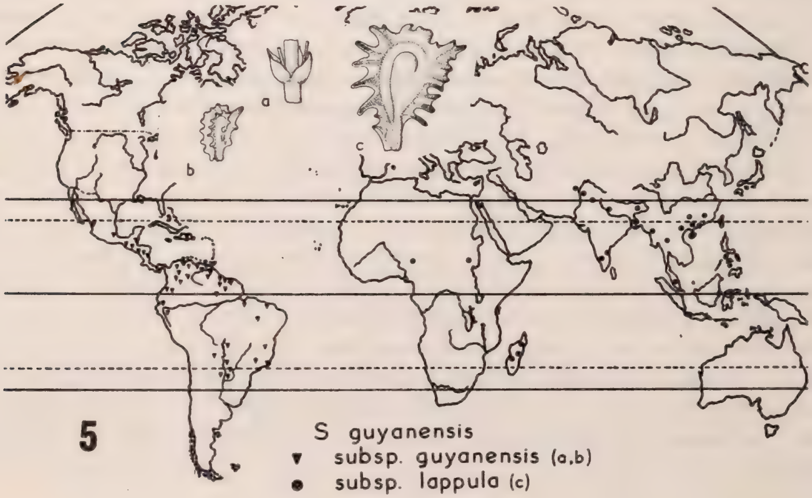
a
b
c
APPROXIMATE SCALE
0 1000 2000 3000 MILES
0 1000 2000 3000 4000 KILOMETERS
120



4

S. pygmaea

a
b
c
SCALE
MILES
KILOMETERS
120
130



5

S guyanensis
▼ subsp. guyanensis (a,b)
● subsp. lappula (c)

3. **Sagittaria sprucei** Micheli in DC. Monogr. Phan. 3: 80. 1881.

Perennial with horizontal rhizome. Leaves emersed, sagittate, prominently veined, with widely ovate, triangular blades 3–14 × 2–11 cm, their lobes 4–12 × 1.5–5 cm, lanceolate-triangular, the petioles 20–60 cm long. Scapes noticeably constricted at the nodes, 25–85 cm long, simple or branching at the lowest whorl, with 4–12 whorls of flowers. Bracts connate at the base, membranous, the linear tips to 1 cm long, occasionally obsolete, often entirely lost. Pistillate flowers subsessile or on short, recurved thickened pedicels to 1.2 cm long; sepals small, 0.5–0.8 × 0.7–1 cm, closely appressed to but scarcely covering a third of the mature receptacle; petals oblong, all white, about twice the length of the sepals. Staminate flowers with short, divaricate pedicels 0.5–1.5 cm long; stamens 9–12, with linear, glabrous filaments 2–3 mm long, the ovate anthers only one third as long. Mature pistillate heads 1.5–2 cm in diameter; achenes large, 4–6 × 2.5–4 mm, the prominent dorsal wing about 0.6 mm wide, the ventral wing nearly obsolete, the faces adorned with a prominent resin duct, the laterally inserted beak 2–2.5 mm long, straight or variously curved. (FIG. 2c, d.)

Type collection: *Spruce s.n.*, 1855, in swamps near Barra (Manoas), Province of Rio Negro, Brazil (holotype K, isotype NY).

Distribution: Amazon Basin, South America. Collections examined from Brazil, Colombia, Peru. (FIG. 2.).

A plant of the quiet, shallow waters of lakes, streams and swamps; apparently confined to the basin of the Amazon River and its tributaries. An infrequently collected and little known species, probably much more common than the collections indicate. All specimens have sagittate, emersed leaves well above the water. Micheli in his original description states that the pistillate flowers are perfect; however, none of the specimens examined indicates the presence of stamens. *Sagittaria sprucei* is most closely related to *S. montevidensis,* sharing with that species the sagittate, prominently veined leaves and the typical floral characteristics of subg. *Lophotocarpus.* It is, however, unique in the constriction of the scape at the nodes, as well as in the size of the achenes and the short to subsessile, pistillate pedicels.

4. **Sagittaria montevidensis** Cham. & Schlecht. Linnaea 2: 156. 1827.

Fibrous-rooted annual, or perennial with short, thick rhizome. Leaves exceedingly variable, emersed, floating or submerged, typically emersed, prominently veined and sagittate, the blades linear to widely ovate, 2–20 × 0.4–25 cm, the linear to ovate, divergent lobes 2–20 × 0.3–15 cm, occasionally reduced or absent, the floating leaves ovate, to 2.5 × 1.5 cm, the submerged leaves reduced to phyllodia 3–45 × 0.4–1.2 cm, occasionally with spatulate ends to 1.5 cm wide, the petioles 8–70 cm long. Scape 7–75 cm long, with 2–12 whorls of flowers, simple or branching from the lowest whorl. Bracts connate, 0.2–2.5 cm long, membranous or occasionally thickened, the tips attenuate or reduced. Pistillate flowers with thickened, recurved pedicels 1–7 cm long; sepals broadly ovate, 0.6–1.5 × 0.6–1.5 cm, closely appressed to the mature receptacle; petals ovate, to 2.2 cm long, white or with purple marking at the base; ring of 9–12 functional stamens occasionally present. Staminate flowers with filiform divaricate pedicels 1–4 cm long; stamens 12–∞, with linear or dilated, glabrous or pubescent filaments 0.7–3.5 mm

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Explanation of Figures 3–5

FIG. 3. Distribution of *S. sagittifolia.* a, achene, × 3. b, bracts, × 1. c, stamen, × 7. FIG. 4. Distribution of *S. pygmaea.* a, achene, × 3. b, bracts, × 1. c, stamen, × 7. FIG. 5. Distribution of *S. guyanensis.* a, b, subsp. *guyanensis.* a, bracts, × ⅔. b, achene, × 3. c, achene of subsp. *lappula,* × 3.

long, the obolong anthers 0.4–1.3 mm long. Mature pistillate heads 0.7–2.5 cm in diameter; achenes narrowly winged, 1.5–3 × 0.6–1.5 mm, the faces with a single short resin duct, or unadorned, the laterally or obliquely inserted beak 0.3–0.9 mm long.

1. Pistillate flowers without functional stamens; petals white with a purple spot at the base; South American.
    2. Pedicels of pistillate flowers somewhat thickened; basal lobes of sagittate leaves somewhat divergent; warm temperate and tropical. 4a. subsp. *montevidensis*.
    2. Pedicels of pistillate flowers greatly inflated toward base of receptacle; basal lobes of sagittate leaves widely divergent; temperate. 4b. subsp. *chilensis*.
1. Pistillate flowers with a ring of functional stamens; petals all white; North American.
    3. Leaves typically sagittate, if bladeless the phyllodia linear; inland plant. 4c. subsp. *calycina*.
    3. Leaves rarely sagittate, the phyllodia lanceolate or spatulate; tidal. 4d. subsp. *spongiosa*.

4a. Sagittaria montevidensis subsp. montevidensis.

Sagittaria pugioniformis var. *montevidensis* Kuntze, Rev. Gen. 3: 328. 1898.
Sagittaria multinerva Larranaga, Escrit. Larr. 1: 1. 1922.

Perennial. Leaves typically emersed, sagittate with linear to ovate blades and somewhat divergent basal lobes, rarely submerged or floating, then the basal lobes absent. Scapes with 3–12 whorls of flowers, simple or branching at the lowest whorl. Bracts connate, the free ends elongate attenuate, to 2.5 cm long. Pistillate flowers rarely with a ring of functional stamens; sepals covering more than one-half of the receptacle at maturity; petals with a purple spot at base. Stamens numerous, the linear sparsely pubescent filaments 1.8–3.5 mm long. Mature pistillate heads 1.5–2.5 cm in diameter; achenes 2–3 × 1–1.5 mm, the resin duct present or obsolete (FIG. 2 e, f.)

Type collection: *Sellow s.n.*, Rio Grande do Sul, Brazil (holotype, not seen, Berlin; photograph of holotype GH, US). At the time this species was described Uruguay was a part of the Brazilian province of Montevideo whose borders included Rio Grande do Sul, hence the specific epithet.

Distribution: Warm-temperate South America, east of the Andes; sporadically northward in the tropics to coastal Ecuador; introduced or adventive elsewhere. Collections examined from Argentina, Bolivia, Brazil, Ecuador, Paraguay, Peru and Uruguay. Adventive but apparently not persisting along the coast of the southeastern United States. Cultivated in many botanical gardens throughout the world including Africa, Java, and the United States. (FIG. 2.)

4b. Sagittaria montevidensis subsp. chilensis (Cham. & Schecht.) Bogin, comb. nov.

Sagittaria chilensis Cham. & Schlecht. Linnaea 2: 155. 1827.
Sagittaria heterophylla Bert. ex Steud. Nom. ed. 2. 2: 491. 1840. Nomen nudum.
Sagittaria incrassata Steud. Nom. ed. 2. 2: 491. 1840. Nomen nudum.
Sagittaria andina Phil. Linnaea 29: 45. 1857.
Sagittaria montevidensis var. *scabra* Micheli in DC. Monogr. Phan. 3: 76. 1881.
Sagittaria alismaefolia Phil. ex Micheli in DC. Monogr. Phan. 3: 76. 1881. Nomen nudum.
Sagittaria taeniaefolia Phil. ex Micheli in DC. Monogr. Phan. 3: 76. 1881. Nomen nudum.
Sagittaria pugioniformis var. *acutifolia* Kuntze, Rev. Gen. 3(2): 328. 1898.
Sagittaria pugioniformis var. *andina* (Phil.) Kuntze, Rev. Gen. 3(2): 328. 1898.
Sagittaria pugioniformis var. *chilensis* (Cham. & Schlecht.) Kuntze, Rev. Gen. 3(2): 328. 1898.

Perennial. Leaves emersed or submerged, the submerged leaves modified into phyllodia 4–25 × 0.4–1 cm, gradually tapering toward the tip, the emersed leaves anceolate, ovate or sagittate with widely divergent lobes. Scapes simple, with 2–8 whorls of flowers. Bracts connate at the base, somewhat thickened, the free ends triangular or elongate. Pistillate flowers with recurved, greatly inflated pedicels 3–5 cm long; sepals covering more than one-half of the receptacle at maturity; petals with a purple spot at base. Stamens numerous, with glabrous dilated filaments to 1.5 mm long. Mature pistillate heads 0.9–1.5 cm in diameter; achenes 2–2.5 × 1–1.4 mm, the resin duct typically absent. (FIG. 2 g.)

Type collection: *Chamisso and Schlechtendal s.n.*, near the city of Concepción, Chile (holotype not seen, presumably at Berlin).

Distribution: Temperate Chile, from near sea level to the middle slopes of the Andes. Collections examined from the provinces of Cautin, Chiloe, Concepcion, Talca, Valdivia. (FIG. 2.)

4c. Sagittaria montevidensis subsp. **calycina** (Engelm.) Bogin, comb. nov.

Sagittaria calycina Engelm. in Torrey, Bot. Mex. Bound. 212. 1859.
Sagittaria calycina var. *fluitans* Engelm. in Torrey, Bot. Mex. Bound. 212. 1859.
Sagittaria calycina var. *maxima* Engelm. in Torrey, Bot. Mex. Bound. 212. 1859.
Sagittaria calycina var. *media* Engelm. in Torrey, Bot. Mex. Bound. 212. 1859.
Sagittaria calycina var. *grandis* Engelm. in A. Gray, Man. Bot. ed. 5. 494. 1867.
Lophiocarpus calycinus (Engelm.) Micheli in DC. Monogr. Phan. 3: 61. 1881.
Lophotocarpus calycinus (Engelm.) J.G.Sm. Mem. Torrey Club 5: 25. 1894.
Lophotocarpus calycinus var. *depauperatus* Engelm. ex J.G.Sm. Missouri Bot. Gard. Rep. 11: 148. 1899. Nomen nudum.
Lophotocarpus californicus J.G.Sm. Missouri Bot. Gard. Rep. 11: 148. 1899.
Lophotocarpus depauperatus J.G.Sm, Missouri Bot. Gard. Rep. 11: 148. 1899.
Lophotocarpus fluitans (Engelm.) J.G.Sm. Missouri Bot. Gard. Rep. 11: 148. 1899.

Annual or Perennial. Leaves emersed, floating or submerged, the emersed sagittate, only rarely without basal lobes, the submerged reduced to linear phyllodia to 45 cm long and 0.5 cm wide, the floating with ovate blades. Scape with 3–12 whorls of flowers, simple or branching at the lowest whorl. Bracts connate, the free ends obtuse or acute, typically less than 1 cm long, occasionally to 2 cm long. Pistillate flowers with thickened recurved pedicels (1–) 2.5–7.5 cm long; sepals covering about one-half the receptacle at maturity; a ring of functional stamens usually present. Stamens with linear pubescent filaments 1–2 mm long. Mature pistillate heads 1–2.5 cm in diameter; achenes 2–2.5 × 0.9–1.3 mm, the resin duct typically present. (FIG. 8a, b.)

Type collection: *J. Hale s.n.*, Red River, Alexandria, Louisiana (lectotype NY; isolectotypes GH, NY). Engelmann in his original description of *Sagittaria calycina* did not cite any examples for the species. He did, however, designate collections for each of the varieties proposed in the same work. The lectotype chosen here is the holotype of var. *maxima*. The types of the other varieties proposed by Engelmann (var. *fluitans* and *media*) are treated as syntypes.

Distribution: United States, western slopes of the Appalachians, south of the Great Lakes, westward and southward to Northern Mexico and California, absent from the Rocky Mountains and the Gulf states east of Louisiana. A plant of fresh water (rarely saline), in ponds, lakes, sloughs, and slow moving streams. Collections examined from Arkansas, California, Colorado, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Missouri, Nebraska, New Mexico, Ohio, Oklahoma, South Dakota, Tennessee, Texas, West Virginia, Virginia, Wisconsin; and from Coahuila, Chihuahua, and Sinaloa in Mexico. (FIG. 8.)

4d. Sagittaria montevidensis subsp. spongiosa (Engelm.) Bogin, comb. nov.
Sagittaria calycina var. *spongiosa* Engelm. in Gray, Man. Bot. ed. 5, 493. 1867.
Lophotocarpus spongiosus (Engelm.) J.G.Sm. Missouri Bot. Gard. Rep. 11: 148. 1899.
Lophotocarpus spatulatus J.G.Sm. Missouri Bot. Gard. Rep. 11: 149. 1899.
Sagittaria spathulata (J.G.Sm.) Buch. Pflanzenreich 4(15): 40. 1903.

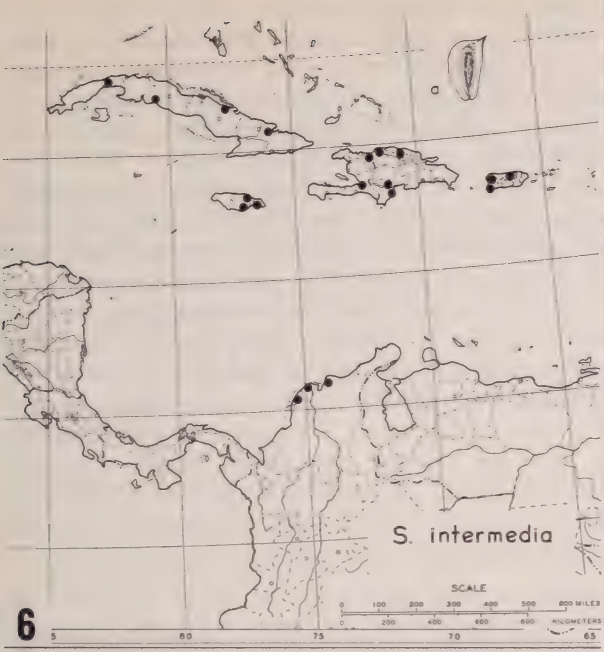
Annual. Plants submerged at high tide, emersed or stranded at low tide. The rare, permanently emersed leaves sagittate, the typical leaves modified into lanceolate phyllodia 4–18 × 0.6–1.1 cm, the free ends often spatulate to 1.5 cm wide. Scape simple, typically reduced to 2–3 whorls of flowers. Bracts connate, to 0.5 cm long, occasionally reduced or absent. Pistillate flowers with thickened recurved pedicels 1–3 cm long; sepals 0.3–0.5 × 0.4–0.6 cm, scarcely covering a third of the receptacle at maturity; functional stamens usually present. Staminate flowers often absent. Stamens ca. 12, with glabrous, linear filaments 0.8–1.3 mm long. Mature pistillate receptacle 0.6–1 cm in diameter; achenes 1.5–2 × 0.8–1.1 mm, the resin duct typically present, the beak often laterally inserted with the free end depressed. (FIG. 8 c.)

Type collection: *Tatnall s.n.*, July 1860, Wilmington, Delaware (holotype MO; isotype GH). The type collection includes plants approaching subsp. *calycina* as well as the more typical tidal forms.

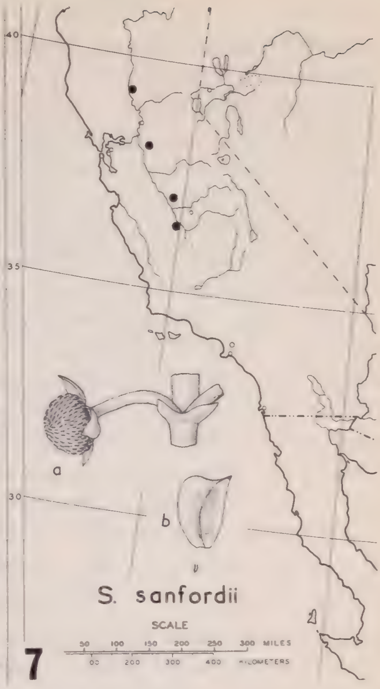
Distribution: Brackish to nearly fresh tidal waters and salt marshes, Potomac River north to the Gaspe. Collections examined from Quebec and New Brunswick in Canada and from Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Virginia in the United States. (FIG. 8.)

A wide ranging New World species, typically warm-temperate in distribution, but present in both tropical and cold-temperate latitudes. *S. montevidensis* is most closely related to the primitive species of the subgenus *Lophotocarpus* (*S. guyanensis, S. rhombifolia, S. sprucei*), sharing with them the closely appressed sepals of the mature pistillate flower. The more advanced members of the subgenus, characterized by the spreading sepals and the semitropical and warm-temperate North American distribution, are apparently derived without exception from *S. montevidensis*. The reduction of *S. chilensis, S. calycina,* and *S. spongiosa* to subspecies of *S. montevidensis* is based on the similarity of the mature achenes and the presence of numerous specimens exhibiting intermediate characteristics. The only workable method of segregating the various subspecies is on the basis of geographical distribution and a few correlated differences that seem more or less constant. The description of each subspecies has intentionally been limited to the typical plants of each; at the same time intermediate plants have been included in each group that can be reliably identified only on their geographic origin. The apparently complete isolation of each subspecies precludes hybridization as a cause for these intermediates and suggests that each group is very closely allied.

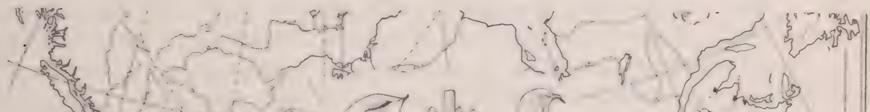
The two wide-ranging subspecies, *montevidensis* of South America and *calycina* of North America, are completely isolated from each other and yet are only tenuously separated on the basis of the presence or absence of a purple spot at the base of the petals, of functional stamens in the pistillate flowers, and of the very plastic characteristic of bract-length. The localized South American subspecies *chilensis*, with widely divergent lobes of the sagittate leaves, enormously enlarged pistillate pedicels and glabrous, dilated filaments, in its typical form differs distinctly from subsp. *montevidensis*; however, all shades of intergradation of characteristics are present within its range. The same situation holds true for the localized subspecies *spongiosa* of North America and subspecies *calycina*. The former is a tidal plant of the Atlantic coast, while the latter ranges inland


a
S. intermedia
SCALE
0 100 200 300 400 500 600 MILES
0 200 400 600 800 KILOMETERS
5
80
75
70
65

6


40
35
30
a
b
S. sanfordii
SCALE
50 100 150 200 250 300 MILES
00 200 300 400 KILOMETERS

7


a
b
c
40
30
20
S. montevidensis
■ subsp. montevidensis
● subsp. calycina (a,b)
▲ subsp. spongiosa (c)
SCALE
0 100 200 300 400 500 600 700 800 900 1000 MILES
0 200 400 600 800 1000 1200 1400 KILOMETERS

8

FIG. 6. Distribution of *S. intermedia*. a, achene, × 3. FIG. 7. Distribution of *S. sanfordii*. a, mature pistillate flower and bracts, × ⅔. b, achene, × 3. FIG. 8. North American distribution of *S. montevidensis*. a, b, subsp. *calycina*. a, achene, × 3. b, bracts, × ⅔. c, achene of subsp. *spongiosa*, × 3.

from the western slopes of the Appalachian Mountains. The extreme tidal form of subsp. *spongiosa* is a unique dwarfed plant characterized by lanceolate or spatulate phyllodia and a scape of 1–3 whorls of flowers (*L. spatulatus* J.G.Sm.). Southwards from Connecticut, an enlarged, emersed, sagittate-leaved form occasionally appears in less brackish waters that is impossible to separate from subsp. *calycina* except on the basis of geography and ecology.

The confused synonymy of the species is due to the very plastic vegetative characteristics, such as leaf-shape and phyllodial modifications resulting from edaphic conditions, and, as seen previously in *S. guyanensis*, to the wide geographic range and the indecision on generic limits. The presence or absence of pubescence on the filament is of only doubtful value in determining the various subspecies, since in many cases it is lost in preparing the plants for mounting (Mason 1952). The presence of functional stamens in the pistillate flower is too erratic to be of real use. The position of the beak and the facial adornment are equally valueless as a means of identification, since all grades of intermediates have been collected. It should be stressed, however, that the combination of these characteristics is usually correlated with the geographical distribution and will, in a great majority of the cases, satisfactorily identify the plant. The key to the subspecies presented above has been formulated on this basis.

5. **Sagittaria sanfordii** Greene, Pittonia 2: 158. 1890.

Perennial with runners and perennating corms. Leaves typically emersed, mostly linear, occasionally with lanceolate to ovate or obovate blades 5–16 × 1.5–6 cm, the submerged leaves modified into phyllodia to 50 cm long, gradually tapering above; petioles 30–70 cm long. Scape simple with 3–8 whorls of flowers. Bracts connate, 0.4–0.6 cm long, their free ends triangular. Pistillate flowers with thickened recurved pedicels 1.5–2.5 cm long; sepals small, 0.4–0.6 cm long, spreading, scarcely covering a fourth of the receptacle at maturity; petals white, about twice as long as the sepals. Staminate flowers with filiform divaricate pedicels 1.5–3 cm long; stamens 15–∞, the slightly dilated filaments about 1.2 mm long, pubescent, the oblong anthers the same length or slightly longer. Mature pistillate flowers 0.8–1.3 cm in diameter; achenes obovate to nearly orbicular, 2–2.6 × 1.2–2 mm, the dorsal wing 0.3–0.5 mm wide, the ventral wing somewhat narrower, the faces unadorned, or with a single low wing, the short, broad-based beaks 0.2–0.5 mm long, vertically or obliquely inserted, occasionally obsolete. (FIG. 7 a, b.)

Type collection: 1890, *Sanford s.n.*, Stockton, San Joaquin Valley, California (holotype, not seen, presumably in Herb. Greeneanum, University of Notre Dame; presumed isotype, UC). No plant from Herbarium Greeneanum was seen, but the plant at UC was labeled as this by Greene without signifying if it was part of the type collection.

Distribution: The Great Valley of California, in fresh to alkaline waters of sloughs, ponds and ditches. (FIG. 7.)

One of the few truly localized species of *Sagittaria*; the others, *S. demersa* and *S. macrophylla*, are both from the same general area and of fairly close relationships. All three are apparently quite abundant within their limited range. *Sagittaria sanfordii* and *S. demersa, S. intermedia,* and *S. subulata* form a more or less intermediate group between the more primitive members of the subgenus *Lophotocarpus* and the subgenus *Sagittaria.* The group is characterized by the gradually increased spreading of the sepals away from the pistillate receptacle, a tendency for the pistillate pedicels to become less thickened, and a uniformly northern-New-World, warm-temperate or semi-tropical distribution. *S. sanfordii* is most closely related to *S. montevidensis* subsp. *calycina*, from which it has apparently evolved. The two plants grow side by side without any reported hybridization, and while they do resemble each other, they are certainly distinct, the most important differences being the reduced or obsolete beak of the mature achene in *sanfordii* and the small, relaxed sepals of the pistillate flower. None of the specimens examined shows any signs of functional stamens in the pistillate flowers, but presumably that condition does exist. *S. sanfordii* and *S. subulata* are the only members of the subgenus perennating by runners and corms, a condition common throughout the *Sagittariae* and undoubtedly correlated with a more northern distribution.

This species until recently was very poorly represented in herbaria and most of the specimens that were seen came from the locality of the type collection. Knowledge of the full range of the plant and a better understanding of its characteristics are due in large measure to the thorough field collections made by Mason et al.

6. **Sagittaria intermedia** Micheli in DC. Monogr. Phan. 3: 80. 1881.

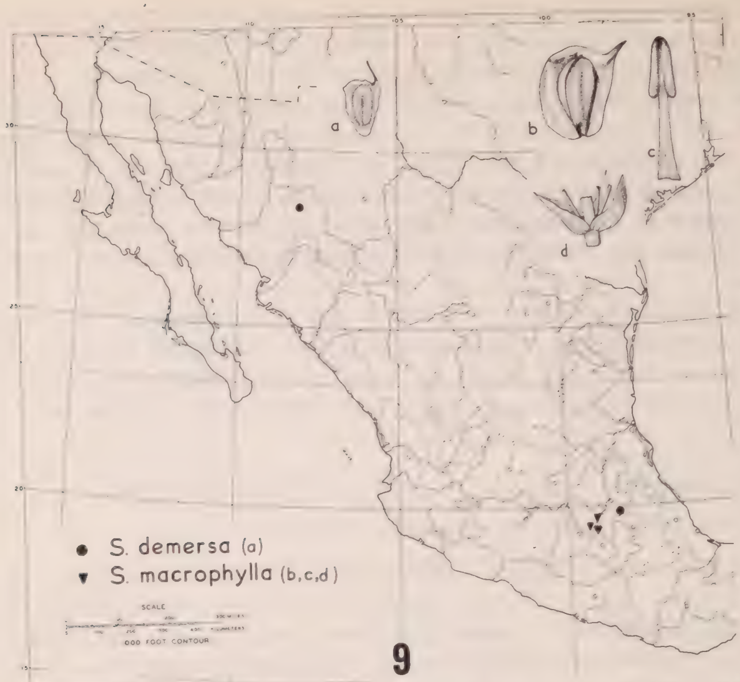
Sagittaria acutifolia Griseb. Cat. Pl. Cuba 218. 1866.

Perennial with short rhizome. Emersed leaves typically sagittate, the blades lanceolate to ovate, 1.5–12 × 0.4–13 cm, the lobes linear to deltoid, 3.5–11 × 0.3–7 cm, occasionally absent, the submerged leaves reduced to lanceolate phyllodia 5–10 × 0.7–1.2 cm, the occasional floating leaves cordate; petioles 9–75 cm long. Scape with 2–9 whorls of flowers, simple or branching from the lowest whorl. Bracts connate, 0.2–0.6 cm long, often reduced or obsolete. Pistillate flowers with thickened, recurved pedicels 0.6–2.0 cm long; sepals ovate, 0.4–0.8 cm long, loosely appressed to the mature receptacle or somewhat spreading; petals white, about twice as long as the sepals; ring of functional stamens occasionally present. Staminate flowers with short, filiform pedicels to 1.0 cm long; stamens 12–21, the glabrous to slightly pubescent filaments 0.9–1.3 mm long, somewhat dilated at the base, the oblong anthers about 1 mm long. Mature pistillate heads 1.0–1.5 cm in diameter; achenes obovate, 1.7–2.2 × 0.9–1.4 mm, the wings 0.25–0.4 mm wide, slightly eroded dorsally, the faces tuberculate or tuberculate-winged, a short resin duct occasionally present, the minute beak 0.1–0.4 mm long, laterally inserted. (FIG. 6.)

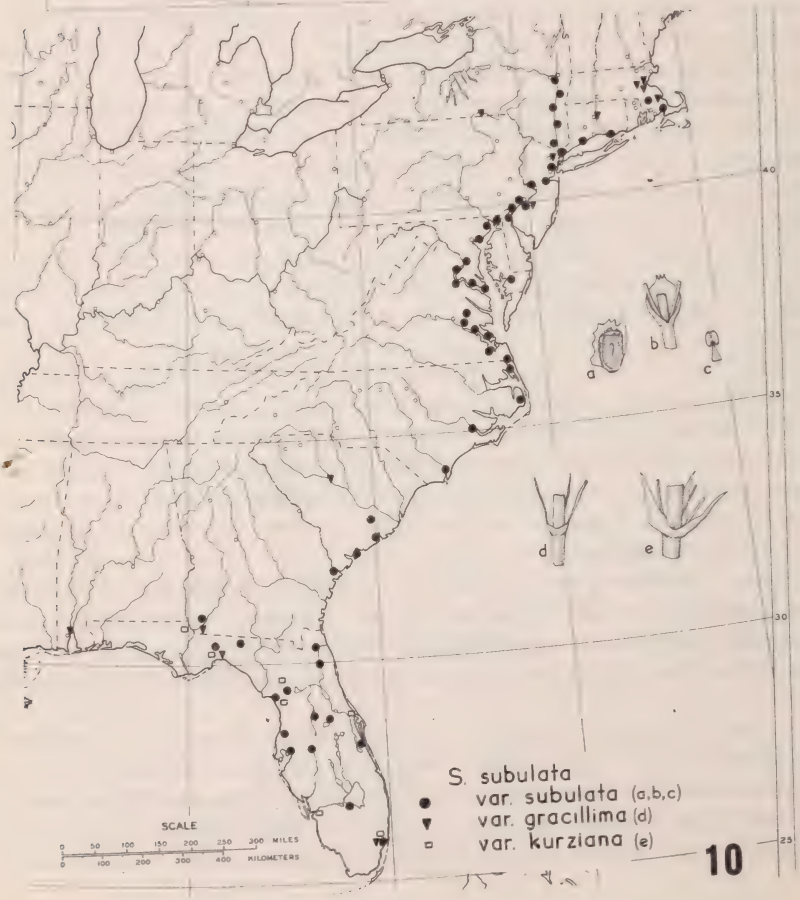
Type collection: *Wright 3199*, Cuba (lectotype K, isolectotypes GH, MO, NY, US). Micheli based his name on *S. acutifolia* Griseb., who cited *Wright 3199* and *Wright 3201*. Micheli, too, cited these specimens in Kew among others, without designating any holotype. Specimens of *Wright 3199* in the American herbaria all have mature achenes and uniformly typify the species. None of these specimens were seen by Micheli, however, so the plant at Kew which he did see must be designated as the lectotype.

Distribution: Caribbean coast of Colombia and the larger West Indian Islands. A common species of widely diverse, aquatic habitats, including bogs, ditches, and salt ponds. Collections examined from Colombia in South America and from Cuba, Dominican Republic, Haiti, Jamaica, and Puerto Rico in the West Indies. (FIG. 6.)

Certain collections of *Sagittaria montevidensis* from South America with achenes that have their faces slightly tuberculate have occasionally been identified as *S. intermedia*. Close comparison of the two species, however, shows sufficient basis for maintaining them as separate and distinct. The two species are undoubtedly very closely related and superficially resemble each other in the


a
b
c
d
● S. demersa (a)
▼ S. macrophylla (b,c,d)
SCALE
1000 FOOT CONTOUR

9


a
b
c
d
e
S. subulata
● var. subulata (a,b,c)
▼ var. gracillima (d)
□ var. kurziana (e)
SCALE
0 50 100 150 200 250 300 MILES
0 100 200 300 400 KILOMETERS

10

prominently veined, sagittate, emersed leaves, and in the recurved, thickened, pistillate pedicels. The bracts of *S. intermedia* are much reduced in size, however, and the tuberculate, short-beaked achenes and small, spreading sepals of the mature pistillate flowers are quite distinct.

The species shows a wide tolerance for varying edaphic conditions, seemingly growing as well in a salt pond as in an inland bog. The plasticity of leaf-shape is possibly correlated with the wide range of habitats. *S. intermedia* and *S. lancifolia* are the only members of the genus found throughout the West Indies, if one exlcudes the infrequently collected and only doubtfully indigenous *S. latifolia.*

7. Sagittaria demersa J.G.Sm. Missouri Bot. Gard. Rep. **6**: 32. 1894.

Fibrous-rooted annual, or perennating by runners. Leaves reduced to submerged phyllodia 10–45 cm long, typically narrowing toward the free ends, these floating and occasionally widened to 0.5 cm. Scape simple, weak, with 3–5 whorls of flowers, these floating. Bracts about 0.4 cm long, connate, sheathing, scarious margined, soon evanescent. Pistillate flowers with thickened recurved pedicels 2.0–3.0 cm long; sepals about 0.4 cm long, spreading at maturity; petals white, about 1.5 times as long as the sepals. Staminate flowers with filiform more or less ascending pedicels 0.8–1.2 cm long; stamens 12–15, the glabrous filaments about 0.8 mm long, dilated below, abruptly contracted above, the oblong anthers about 0.5 mm long. Mature pistillate heads 0.5–0.6 cm in diameter; achenes obovate, 1.6–2.0 × 0.9–1.2 mm, the wings narrow, the faces unadorned, the filiform beak about 0.5 mm long, obliquely to vertically inserted. (FIG. 9a.)

Type collection: *Pringle 1367,* pond near Guerrero, Chihuahua, Mexico (holotype NY, isotypes GH, MEX, NY, US).

Distribution: Ponds and lakes of the Mexican highlands. (FIG. 9.)

MEXICO. Chihuahua: La Junta, *LeSeuer 273* (GH). Hidalgo: Lake Apam, Apam, *H. E. Moore 3454* (GH, US).

A species of limited geographic range, collected only three times, these stations some 500 miles apart in the Mexican highlands. It probably is present, and should be sought, at intermediate points. While it must be considered a very local plant, it is extremely abundant where found; Moore describes it as forming great masses. *S. demersa* shows relationship with both *S. montevidensis* subsp. *calycina* and *S. subulata*, and may be intermediate between these two species. It may be distinguished from *S. montevidensis* by the spreading, small sepals of the pistillate head, from *S. subulata* by the scarious-margined, sheathing, connate bracts, and from both by the filiform beak of the unadorned achene.

8. Sagittaria subulata (L.) Buch. Abh. Nat. Ver. Brem. **2**: 490. 1871.

Annual, or perennating by runners and corms. Submerged or tidal plant. Leaves reduced to phyllodia 5–90 cm or more long, 0.1–1.4 cm wide, the floating ends occasionally widened into more or less distinct lanceolate to ovate blades 2–6 × 0.5–2.5 cm, rarely cordate or sagittate. Scapes 5–90 cm long or longer, typically simple with 1–10 whorls of flowers, rarely branching from the lowest whorl. Bracts typically connate at the base, sheathing, 0.2–0.4 cm long, somewhat scarious margined, the caudate ends to 3 cm long, occasionally spathe-like, soon evanescent. Pistillate flowers with variously thickened recurved pedicels

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Explanation of Figures 9, 10

FIG. 9. Distribution of two Mexican species of *Sagittaria*. a, achene of *S. demersa,* × 3. b–d, *S. macrophylla.* b, achene, × 3. c, stamen, × 3. d, bracts, × ⅔. FIG. 10. Distribution of *S. subulata.* a–c, var. *subulata*. a, achene, × 3. b, bracts, × 1. c, stamen, × 3. d, bracts of var. *gracillima,* × ⅔. e, bracts of var. *kurziana,* × ⅔.

1–15 cm long; sepals 0.2–0.5 cm long, widely spreading at maturity; petals white, ca. twice as long as the sepals. Staminate flowers with divaricate to ascending pedicels 1–3.5 cm long; stamens 7 or 9–15, the glabrous, subulate filaments 0.6–1.3 mm long, the oblong anthers 0.4–0.8 cm long. Mature pistillate heads 0.5–0.7 cm in diameter; achenes obovate, plump, 1.5–2 × 0.9–1.4 mm, the narrow wings slightly crenate dorsally, the faces adorned with 1–3 crenate wings, the subulate recurving beak 0.15–0.35 mm long, obliquely inserted.

1. Phyllodia only 1–6 mm wide.
  2. Plant typically dwarf and tidal, if not tidal the phyllodes to 30 cm long, the floating ends often bladelike. 8a. var. *subulata.*
  2. Plant typically elongate, not tidal, the phyllodes more than 30 cm long, very narrow, the floating ends rarely bladelike. 8b. var. *gracillima.*
1. Phyllodia 7–14 mm wide; typically all parts greatly enlarged throughout. 8c. var. *kurziana.*

8a. Sagittaria subulata var. subulata.

Alisma subulatum L. Sp. Pl. 343. 1753
Sagittaria natans Michx. Fl. Bor.-Am. 190. 1803.
Sagittaria pusilla Nutt. Gen. 2: 213. 1818.
Sagittaria natans var. *lorata* Chapm. Fl. So. U.S. 499. 1860.
Sagittaria subulata (L.) Buch. Abh. Nat. Ver. Brem. 2: 490. 1871.
Sagittaria subulata var. *natans* (Michx.) J.G.Sm. Missouri Bot. Gard. Rep. 6: 18. 1894.
Sagittaria filiformis J.G.Sm. Missouri Bot. Gard. Rep. 6: 20, p.p. 1894.
Sagittaria natans var. *pusilla* (Nutt.) Chapm. Fl. So. U.S. ed. 3. 474. 1897.
Sagittaria subulata var. *pusilla* (Nutt.) Buch. Pflanzenreich 4(15): 58. 1903.
Sagittaria lorata (Chapm.) Small, N.Am. Flora 17(1): 52, p.p. 1909.
Sagittaria stagnorum Small, Man. SE. Fl. 24. 1933.
Sagittaria subulata var. *typica* Fernald, Rhodora 42: 408. 1940.
Sagittaria subulata var. *lorata* (Chapm.) Fernald, Rhodora 42: 409. 1940.
Sagittaria subulata subsp. *lorata* (Chapm.) Clausen, Torreya 41: 161. 1941.

Annual, or perennating by runners and corms. Tidal or submerged plant. The submerged leaves modified into phyllodia 5–30 × 0.1–0.6 cm, the floating ends occasionally dilated into ovate blades 2–6 × 0.8–2 cm, rarely cordate or sagittate. Scape simple, 5–40 cm long, with 1–6 whorls of flowers. Bracts connate, the ends caudate to 0.6 cm long, occasionally spathe-like, scarious-margined, evanescent. Pistillate flowers with slightly thickened, recurved pedicels 1–3.5 cm long. Staminate flowers with 7 or 9–12 stamens. Achene faces 1(–3)-winged. (FIG. 10a-c.)

Type collection: *ex herb. Gronovii s.n.,* "Virginia" (holotype not seen, British Museum, photograph of holotype, GH).

Distribution: Coastal plain of eastern United States, from Massachusetts to Alabama. Mostly in tidal waters, occasionally, especially southwards, in ponds and other quiet waters. Collections examined from Alabama, Connecticut, Delaware, District of Columbia, Florida, Georgia, Maryland, Massachusetts, New Jersey, New York, North Carolina, Pennsylvania, South Carolina, Virginia. (FIG. 10.)

8b. Sagittaria subulata var. gracillima (S. Wats.) J.G.Sm. Mem. Torrey Club 5: 26. 1894.

Sagittaria natans var. *gracillima* S. Wats. in A. Gray, Man. Bot. ed. 6, 556. 1890.
Sagittaria filiformis J.G.Sm. Missouri Bot. Gard. Rep. 6: 20, p.p. 1894.
Sagittaria lorata Small, N.Am. Flora 17(1): 52, p.p. 1909.

Perennial with runners. Leaves submerged, modified into phyllodia 30–90 × 0.1–0.3 cm, the floating free ends rarely bladelike, to 3.5 × 0.5 cm. Scapes 30–90 cm long or longer, simple with 2–6 whorls of flowers. Bracts scarcely connate, caudate-tipped to 1 cm long, soon evanescent. Pistillate flowers with scarcely thickened, recurved pedicels 5–15 cm long. Staminate flowers with 7 or 9 stamens. Mature achenes with faces 3-winged, unknown except in the extreme southern portion of the range. (FIG. 10d.)

Type collection: July 1877, *Hitchings s.n.*, Neponsit R., Readville, Norfolk Co., Massachusetts (lectotype, GH). When Watson proposed *S. natans* var. *gracillima* in the sixth edition of Gray's Manual, he cited a number of collections without designating a type. All of these are in the Gray Herbarium and all bear the same annotations. The proposed lectotype is a specimen cited and named by Watson that is typical of var. *gracillima*.

Distribution: Sporadic throughout the range of the species from Massachusetts south, apparently absent south of New Jersey and north of South Carolina. In the moving fresh waters of small streams or occasionally in ponds especially southward. Collections examined from Alabama, Connecticut, Florida, Georgia, Massachusetts, New Jersey, New York, Rhode Island, South Carolina. (FIG. 10.)

8c. Sagittaria subulata var. **kurziana** (Glück) Bogin, comb. nov.
Sagittaria kurziana Glück, Bull. Torrey Club 54: 257. 1927.

Perennial with runners and corms. Leaves modified into submerged phyllodia 10–90 cm or more long, 0.7–1.4 cm wide, the floating free ends rarely bladelike, ovate, to 4.5 × 1.7 cm. Scape 45–90 cm or more long, simple with 4–10 whorls of flowers, occasionally branching from the lowest whorl. Bracts connate at the base, rarely spathe-like, the filiform ends 1–3 cm long, usually persistent. Pistillate flowers with thickened recurved pedicels 2–9 cm long. Staminate flowers with 9–15 stamens. Achene faces 2- or 3-winged. (FIG. 10e.)

Type collections: 3/11/26, *Glück s.n.*, Wakulla R., Wakulla Co., Florida (holotype, not seen, presumably at Berlin; isotype, US).

Distribution: Florida, in slow-moving streams (where greatly elongated), ponds, and pools. (FIG. 10.)

S. subulata is a plant limited to the coastal regions of the Eastern United States, in both tidal and fresh waters. An exceedingly plastic species vegetatively, which is only hesitantly separated into three proposed varieties. These are all similar florally, and merge into one another vegetatively without sharp demarcation in structure or distribution.

Variety *subulata*, in its typical form, is a dwarfed phyllodial plant of tidal waters (*S. pusilla* Nutt.). In quiet fresh water it develops floating, bladed leaves (*S. natans* Michx.), or longer phyllodes (var. *lorata* Chapm.).

Variety *gracillima* is typically an elongate plant with narrowed phyllodes limited to fresh water streams in the north and also in ponds in the south. Preliminary investigation seems to show that in its northern range, at least, this variety is a polyploid (2n = 44). The sharp break in its distribution from Delaware south through North Carolina suggests the possibility that all the northern plants are introduced from the south. This premise gains additional weight when it can be shown that the northern plant is apparently sterile, never producing mature achenes and reproducing solely by means of runners, and that it was not collected before the 1860's. That the plant was never collected earlier in a region so well botanized and that the plant is a common aquarium aerator further substantiate the possibility of its being introduced.

Variety *kurziana* in its typical form is a greatly elongated plant with wide phyllodes, growing in the slow-moving, warm waters of several Floridan streams. In quiet pond waters, it is a much smaller plant but is still characterized by wide phyllodes and elongate, persistant bracts. Griscom notes (no. 21509, GH), that the leaves reach a length of fifty feet. If this is so, var. *kurziana* must be regarded as having some of the longest recorded angiosperm leaves. The remarkably elongate inflorescence must also be regarded as approaching a record length. This taxon needs further study to determine the causes of this great size. The answer probably should be sought in its ecology and cytology.

S. subulata, with recurved and variously thickened pistillate pedicels and widely spreading (but not reflexed) sepals, is most closely related to *S. demersa* and *S. montevidensis*. It probably represents the end-line in development in the subgenus *Lophotocarpus*. The point of origin of the subgenus *Sagittaria,* marked by its reflexed sepals, in uncertain.

Subgenus 2. Sagittaria.

Sagitta Adans. Fam. Pl. 2: 459. 1763.
Diphorea Raf. Noegen. 3. 1825.
Drepachnia Raf. Neogen. 3. 1825.
Sagittaria sect. *Eusagittaria* Benth. & Hook. Gen. Pl. 3(2): 1006. 1883.

Mature pistillate flowers with reflexed sepals, their pedicels mostly ascending, if recurved, not markedly thickened. Perfect flowers rarely present. (Species 9–20.)

9. Sagittaria rigida Pursh, Fl. Am. Sept. 2: 397. 1814.

Sagittaria bulbosa Donn, Hort. Cant. ed. 6. 246. 1811. Nomen nudum.
Sagittaria heterophylla Pursh, Fl. Am. Sept. 2: 397. 1814.
Sagittaria sagittifolia var. *minor* Hook. Fl. Bor. Am. 2: 167, p.p. 1840.
Sagittaria sagittifolia var. *rigida* (Pursh) Torr. Nat. Hist. N.Y. 2(2): 259. 1843.
Sagittaria heterophylla var. *fluitans* Engelm. in A. Gray, Man. Bot. ed. 2. 439. 1856.
Sagittaria heterophylla var. *angustifolia* Engelm. in A. Gray Man. Bot. ed. 5. 494. 1867.
Sagittaria heterophylla var. *elliptica* Engelm. in A. Gray, Man. Bot. ed. 5. 494. 1867.
Sagittaria heterophylla var. *rigida* (Pursh) Engelm. in A. Gray, Man. Bot. ed. 5. 494. 1867.
Sagittaria rigida var. *engelmanniana* Farw. Ann. Rep. Comm. Parks Detroit 44. 1900.
Sagitta rigida (Pursh) Nieuwl. Am. Midl. Nat. 3: 22. 1913.

Perennial with runners. Emersed or submerged. Emersed leaves with linear to elliptical blades 5–15 × 0.6–12 cm, occasionally with one or two linear recurving or divergent lobes, the submerged leaves modified into phyllodia 30–70 cm long or longer, the occasional floating ends rarely widened into a linear to lanceolate blade; petioles 15–105 cm long. Scapes 10–115 cm long or longer, simple, with 2–6 whorls of flowers, typically geniculate at the lowest whorl. Bracts connate, 0.4–0.6 cm long, obtuse. Pistillate flowers sessile or subsessile, rarely with ascending pedicels to 2.5 cm long; sepals 0.4–0.7 cm long, reflexed at maturity; petals white, ca. twice as long as the sepals. Staminate flowers with ascending pedicels 1–3 cm long; stamens 15–∞, the pubescent filaments 1–2 mm long, widened at the base, gradually tapering above, the ovate anthers 0.6–1.2 mm long. Mature pistillate heads echinate, 1–1.7 cm in diameter; achenes obovate to oblong, 2–3 × 1.3–1.6 mm, the narrow wings 0.1–0.3 mm wide, the faces typically with a long resin duct (this occasionally reduced or absent), the stoutish recurved beak 0.8–1.4 mm long, obliquely or vertically inserted. (FIG. 13a-c.)

Type collection: *Pursh s.n.*, Canada (lectotype, NY). A search of the herbarium at the Academy of Natural Sciences in Philadelphia failed to uncover either of the plants Pursh described as *S. rigida* and *S. heterophylla,* and they are presumed to be lost. The only Pursh collection at hand of this species is the plant chosen as the lectotype. The specimen is quite small and very juvenile, but can readily be identified by the long recurving beak of the immature achene, the subsessile pistillate flower, and the pubescent filaments somewhat longer than the anthers.

Distribution: Southeastern Canada and Northeastern United States; Quebec and Ontario south to Virginia, Kentucky and Missouri, west to Nebraska. In fresh to brackish, tidal waters, more commonly in the inland, calcareous waters of lakes and streams. The species has been reported as introduced and established in Europe; however, available European collections ascribed to this species seem to be a short-pediceled, deep-water form of *S. sagittifolia* L. Collections examined from Quebec, and Ontario in Canada and from Connecticut, Delaware, Illinois, Indiana, Iowa, Kentucky, Maine, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Tennessee, Vermont, Virginia, Wisconsin in the United States. (FIG. 13.)

Leaf-shape and the length of both leaf and scape are profoundly modified by the habitat. Some plants of deep, slow-moving streams have elongated scapes to "many meters long" (Fernald 1950, p. 89), while some plants stranded on mud flats reach full maturity with a leaf and petiole less than 20 cm long. The occurrence of linear lobes on the emersed blades seems quite haphazard, but they are common only on ovate or elliptical leaves.

S. rigida is very closely related to *S. graminea* and apparently hybridizes with that plant. Both species occur together and the absence of large numbers of intermediates suggests that the hybrids are more or less sterile. Experimental work is needed to substantiate these observations. The large achenes with the stoutish, recurved, and elongate beaks, the sessile pistillate flowers, and the bending of the scape at the lowest whorl are all distinctive. The presence of pubescent filaments, reflexed sepals on mature pistillate heads, and commonly non-sagittate leaves is shared with *S. lancifolia* as well as *S. graminea*. The large synonymy, most of it on a subspecific level, has resulted solely from the plastic vegetative characteristics.

10. Sagittaria graminea Michx. Fl. Bor.-Am. **2**: 190. 1803.

Annual, or perennial with runners and corms and/or horizontal rhizomes. Leaves emersed or submerged, the emersed blades linear to ovate, 1.5 × 0.5–10 cm, rarely with basal lobes, the submerged leaves modified into strap-shaped or spongy terete phyllodia to 50 cm long and to 2.5 cm wide, the petioles 2–55 cm long. Scapes 5–120 cm long, simple, with 2–12 whorls of flowers, or rarely branching from the lower whorls. Bracts scarcely to fully connate, the free ends 0.2–1.5 cm long, occasionally obsolete. Pistillate flowers with ascending pedicels 0.5–6.5 cm long (in one variety the pedicels recurved and somewhat thickened); sepals 0.3–0.6(–0.8) cm long, reflexed at maturity; petals white or pink, ca. twice as long as the sepals. Staminate flowers with 12–∞ stamens, the dilated pubescent filaments 0.4–1.5 mm long, the oblong anthers 0.6–1.7 mm long. Mature receptacle 0.5–1.5 cm in diameter; achenes oblong to obovate, 1.2–3 × 0.8–1.8 mm, the dorsal wings 0.15–0.6 mm wide, the ventral wings only half as wide, the faces adorned with 1–3 wings, these occasionally crenate or absent, the obliquely inserted beak 0.1–0.4 mm long, occasionally longer or obsolete.

1. Pistillate pedicels recurved, the subulate beak of the mature achene 0.3 mm. or more long; south-central and Gulf States. 10b. var. *platyphylla*.
1. Pistillate pedicels ascending, if recurved the achene beak less than 0.3 mm.
  2. Scapes branching at the lowest whorl; bracts scarcely connate, the free ends linear, elongate; Alabama, Florida, Georgia. 10f. var. *chapmani*.
  2. Scapes simple; bracts moderately to fully connate, the free ends triangular, obtuse, or obsolete.
    3. Submerged leaves modified into spongy terete phyllodia; bracts fully connate; achene facial wings crenate; in acid water, coastal Massachusetts, Long Island, New Jersey. 10c. var. *teres*

3. Phyllodia strap-shaped, if terete, not markedly spongy; bracts not fully connate.
    4. Phyllodes 1 cm or more wide; mature pistillate pedicels 4 cm or more long; southern coastal plains. 10d. var. *weatherbiana*.
    4. Phyllodes less than 1 cm wide; mature pistillate pedicels shorter.
        5. Filaments exceeding the anthers; western Great Lakes. 10e. var. *cristata*.
        5. Filaments shorter than or equaling the anthers.
            6. Achenes 2.5 mm or more long; highlands of North and South Carolina. 10g. var. *macrocarpa*.
            6. Achenes 2.0 mm or less long; throughout eastern North America. 10a. var. *graminea*.

10a. Sagittaria graminea var. graminea.

Sagittaria acutifolia Pursh, Fl. Am. Sept. 2: 397. 1814.
Sagittaria simplex Torr. Comp. 356, p.p. 1826.
Sagittaria sagittifolia var. *simplex* (Torr.) Hooker, Fl. Bor. Am. 2: 167. 1840.
Sagittaria purshii Kunth, Enum. Pl. 3: 160. 1841.
Sagittaria stolonifera Engelm. & Gray, Bost. Jour. Nat. Hist. 5: 234. 1847.
Sagittaria lancifolia L. var. *angustifolia* (Lindl.) Griseb. Cat. Pl. Cuba 218, p.p. 1866.
Sagittaria graminea var. *cycloptera* J.G.Sm. Missouri Bot. Gard. Rep. 6: 26. 1894.
Sagittaria isoetiformis J.G.Sm. Missouri Bot. Gard. Rep. 6: 115. 1895.
Sagittaria cycloptera (J.G.Sm.) Mohr, Bull. Torrey Club 24: 20. 1897.
Sagittaria eatoni J.G.Sm. Missouri Bot. Gard. Rep. 11: 150. 1899.
Sagitta graminea (Michx.) Nieuwl. Am. Midl. Nat. 3: 22. 1913.
Sagittaria edwardsiana Clausen, Rhodora 39: 30. 1937.
Sagittaria graminea subsp. *edwardsiana* Clausen, Torreya 39: 129. 1939.

Annual, or perennial with corms or rhizomes. Emersed leaves with linear to ovate blades, rarely with basal lobes, the variously thickened or strap-shaped phyllodia to 40 cm long and 1 cm wide. Scape with 2–8 whorls of flowers. Bracts moderately connate, the free ends 0.2–0.6 cm long. Pistillate flowers with ascending (rarely recurving) pedicels 1–3.5 cm long; petals white or pink. Stamens 12–∞, the filaments 0.4–1 mm long. Mature receptacle 0.5–1 cm in diameter; achenes obovate, 1.4–2 × 0.8–1.2 mm, the dorsal wing occasionally erose, the faces plain, or with 1–2 narrow wings, the beaks 0.1–0.3 mm long, occasionally nearly obsolete. (FIG. 14a-c.)

Type collection: *Michaux s.n.*, 'Canada' (holotype, not seen, in Herb. Michaux, Paris; fragment of the holotype, MO).

Distribution: Eastern North America from southern Labrador to Cuba, westward to the Great Plains. Common over most of its range in diverse fresh water habitats, but noticeably sporadic in the Appalachian Mountains and in the northwest. The common tidal *Sagittaria* of the northeast but apparently absent in tidal waters south of Virginia. Collections examined from Labrador, New Brunswick, Newfoundland, Nova Scotia, Ontario and Quebec in Canada; from Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Indiana, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, West Virginia, and Wisconsin in the United States; from Cuba in the West Indies. (FIG. 14.)

10b. Sagittaria graminea var. platyphylla Engelm. in A. Gray, Man. Bot. ed. 5. 494. 1867.

Sagittaria recurva Engelm. ex Patterson, Checklist 130. 1887. Nomen nudum.
Sagittaria platyphylla (Engelm.) J.G.Sm. Missouri Bot. Gard. Rep. 6: 29. 1894.
Sagittaria mohrii J.G.Sm. in Mohr, Bull. Torrey Club 24: 19. 1897.

Perennial with corms and horizontal rhizomes. Emersed leaves with linear to ovate blades, rarely cordate or with basal lobes, the occasional strap-shaped phyllodia to 45 cm long and 1.5 cm wide. Scape simple, with 3–8 whorls of flowers. Bracts strongly connate, 0.3–0.7 cm long the free ends obtuse. Pistillate flowers with somewhat thickened recurved pedicels 1.5–3 cm long. Stamens 15–21, the filaments 0.8–1.5 mm long, as long as or somewhat exceeding the anthers. Mature receptacle 0.8–1.5 cm in diameter; achenes cuneate-obovate, 1.2–2 × 0.8–1.2 mm, the faces with 1(–3) slender wings, the subulate beak 0.3–0.6 mm long. (FIG. 11a-c.)

Type collection: *Lindheimer 713*, Texas (lectotype MO; isolectotypes GH, MO, NY, US). Engelmann did not cite any collections in his original description. The selected lectotype is a specimen in Engelmann's herbarium so named by him that is characteristic of the variety.

Distribution: Southeastern Missouri, west to Kansas, south to Texas and Alabama. A common plant especially in the Gulf States, in sloughs and swamps, less common in small lakes and streams. Adventive in the Canal Zone since the opening of the Panama Canal and apparently well established there. Collections examined from Alabama, Arkansas, Kansas, Louisiana, Mississippi, Missouri, Oklahoma and Texas in the United States and from the Canal Zone in Central America. (FIG. 11.)

10c. Sagittaria graminea var. teres (S. Wats.) Bogin, comb. nov.

Sagittaria teres S. Wats. in A. Gray, Man. Bot. ed. 6. 555. 1890.

Perennial with runners and corms. Occasional emersed leaves with small linear blades to 3 cm long and 0.5 cm wide, their petioles 20–50 cm long, the typical spongy terete gradually tapering phyllodia 5–15 cm long. Scape with 2–4 whorls of flowers. Bracts fully connate, 0.2–0.3 cm long, the free ends minute, obtuse or obsolete. Pedicels 1–3 cm long. Stamens 12–15, the filaments 0.7–1.2 mm long, as long as or slightly shorter than the anthers. Mature receptacle 0.6–1 cm in diameter; achenes obovate-cuneate, 2.0–2.5 × 1.2–1.5 mm, the dorsal wing crenate, the faces with 1–3 prominent, crenate wings, the thickish beak 0.3–0.4 mm long, obliquely inserted. (FIG. 11d-f.)

Type collection: 8/21/88, *Deane s.n.*, Lewis Pond, Hyannis, Barnstable Co., Massachusetts (lectotype GH). Watson cites this specimen and one collected by E. S. Miller at Wading River, Long Island, N.Y., in his original description. The Deane specimen characterizes the variety in every way and has been selected as the lectotype.

Distribution: Cape Cod to southern New Jersey. Sporadic in the acid waters of lakes and bogs of the coastal plain. Often found in association with *Sagittaria engelmanniana* and apparently locally abundant. Collections examined from Massachusetts, New York and New Jersey. (FIG. 11.)

10d. Sagittaria graminea var. weatherbiana (Fernald) Bogin, comb. nov.

Sagittaria weatherbiana Fernald, Rhodora **37**: 387. 1935.

Perennial with short thick rhizomes and runners. Emersed leaves with lanceolate to elliptical blades 10–25 × 2–8 cm, the strap-shaped phyllodia 10–20 × 1–2.5 cm, the petioles 15–50 cm long. Scapes 30–75 cm long, with 3–8 whorls of flowers. Bracts moderately connate, 0.4–0.9 cm long, the free ends triangular. Pistillate pedicels (2–)4–6.5 cm long. Stamens 12–18, the filaments 1–1.3 mm long, ca. the same length as the anthers. Mature receptacle 0.7–1.2 cm in diameter; achenes cuneate-obovate, 2–2.5 × 1.1–1.5 mm, the faces unadorned or with 1–3 narrow wings, the beak 0.1–0.3 mm long. (FIG. 11g-i.)

Type collection: *Fernald, Griscom and Long 4297*, swamp north of Land of Promise, Princess Anne Co., Virginia (holotype GH; isotype GH).

Distribution: Atlantic coastal plain of the southeastern United States from Virginia to South Carolina and possibly Florida. A plant of the swampy lowlands with a unique vegetative period; Fernald states that it produces leaves in the fall of the previous year and has finished flowering by June. Collections examined from Virginia, North Carolina, South Carolina, Florida. (FIG. 11.)

10e. Sagittaria graminea var. **cristata** (Engelm.) Bogin, comb. nov.

Sagittaria cristata Engelm. in Arthur, Contr. Flor. Iowa 5: 3. 1882.

Annual, or perennating by runners and corms. Emersed leaves with linear or lanceolate blades 4–8 × 0.5–1.5 cm, the thickish phyllodia to 10 cm long, petioles 15–50 cm long. Scapes 20–60 cm long, with 3–6 whorls of flowers. Bracts moderately connate, 0.4–1 cm long, the free ends triangular. Pedicels 1.5–3.0 cm long. Stamens numerous, the filaments 1.2–1.7 mm long. Mature receptacle 1.2–1.8 cm in diameter; achenes obovate, 2.5–3 × 1.4–1.8 mm, the broad dorsal wing crenate, the faces 1-winged, the subulate beak 0.4–0.7 mm long. (FIG. 11j-l.)

Type collection: 1881, *Cratty s.n.*, Armstrong, Emmett Co., Iowa (lectotype MO; isolectotype MO, NY). The numerous sheets of this collection in the Engelmann herbarium were not annotated by Engelmann. A representative sheet was therefore selected as the lectotype.

Distribution: Canadian shores of Lake Huron, southwesterly to northern Iowa. Common in lakes and swamps especially in Minnesota and Wisconsin; there to a great extent, replacing var. *graminea*. Collections examined from Ontario in Canada and from Iowa, Michigan, Minnesota, and Wisconsin in the United States. (FIG. 11.)

10f. Sagittaria graminea var. **chapmani** J.G.Sm. Missouri Bot. Gard. Rep. **6**: 26. 1897.

Sagittaria chapmani Mohr, Bull. Torrey Club **24**: 20. 1897.

Perennial with horizontal rhizome. Emersed leaves linear to lanceolate, 15–25 × 1.5–4 cm, the broad phyllodia to 40 cm long, the petioles 15–30 cm long. Scape 30–70 cm long, with 5–12(–15) whorls of flowers, branching at the lower whorls. Bracts scarcely connate, to 1.5 cm long, the free ends linear. Stamens 18–∞, the filaments ca. 1.2 mm long, the anthers ca. the same length. Mature receptacle small, ca. 0.5 cm in diameter; achenes small, 1–1.4 × 0.7–0.9 mm, the faces plain, or 1- 2-winged, the beaks 0.2 mm long to obsolete. (FIG. 11m,n.)

Type collection: 1862, *Chapman s.n*, in creek on road to Marianna, Jackson Co., Florida (holotype NY).

Distribution: Extreme southeastern United States from Georgia to Alabama. Apparently not too common, in swamps, ponds, and small streams, usually found in association with var. *graminea;* intermediates, probably hybrids, are not rare. Collections examined from Alabama, Florida, Georgia. (FIG. 11.)

10g. Sagittaria graminea var. **macrocarpa** (J.G.Sm.) Bogin, comb. nov.

Sagittaria macrocarpa J.G.Sm. Missouri Bot. Gard. Rep. **6**: 27. 1894.

Perennial with runners. Emersed leaves spatulate, 15–30 cm long, to 2 cm wide, the somewhat thickened phyllodia 15–25 cm long. Scape 15–30 cm long, with 2–4 whorls of flowers. Bracts moderately connate, ca. 0.4 cm long, the free ends triangular. Stamens (9–)12–18, the filaments ca. 1 mm long. Mature receptacle 0.8–1.2 cm in diameter; achenes large, 2.5–3.5 × 1.3–2 mm, the prominent dorsal wing crenate-crested, the faces plain or with 1–3 low ribs, the beak subulate, to 0.4 mm long, occasionally obsolete. (FIG. 11o.)

Type collection: *Curtis 'C'*, ponds, South Carolina (holotype MO; isotype GH). The type specimen unfortunately is not at all typical of the bulk of the collections, and indeed, comes very close to being intermediate between var. *graminea* and var. *macrocarpa*. The large crested achenes are distinctive, however, to serve safely to identify the type specimen and other intermediates as var. *macrocarpa*.

Distribution: North and South Carolina. A local plant of the highlands, but not the mountains, present in bogs, ponds, and sluggish streams. All the collections seen appear to be confined to Henderson Co., North Carolina and vicinity, except for the type collection which is labelled "South Carolina." (FIG. 11.)

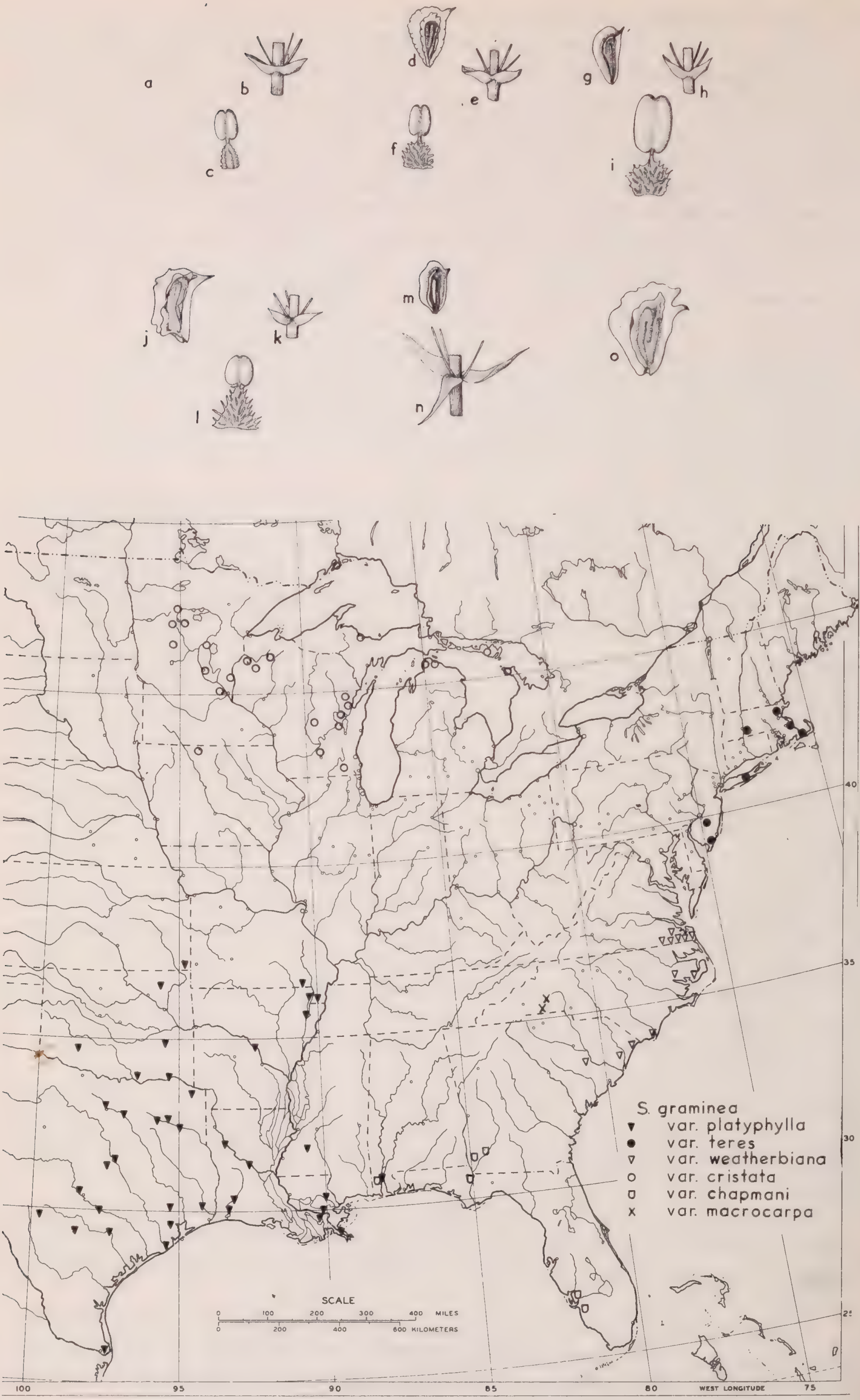
Sagittaria graminea is the only member of the genus with pubescent, dilated filaments. It apparently hybridizes with all other Sagittarias that have pubescent filaments and occur within its range, including *S. rigida* and *S. lancifolia*, both of which are closely related to it, and *S. montevidensis* from which it may have evolved.

In a genus characterized by variable species, *S. graminea* probably represents the high tide of that variability. Every characteristic is extremely plastic and it is the exception rather than the rule that enough variable factors become correlated in a geographic pattern to warrant the formation of a separate taxon. Altogether six varieties in addition to var. *graminea* are here recognized. All have been treated at one time or another as separate species, but careful study of some 1200 collections shows no basis for following this course. All these varieties fall entirely within the range of *S. graminea* var. *graminea*, but otherwise none of them ever encroaches on the geographic distribution of any other. Each shows some intergradation in its own range with var. *graminea*, and certain plants of similar appearance may occur in populations of var. *graminea* well removed from its accepted range. At the same time the extremes of these taxa are certainly distinctive and could not, except in a most juvenile state, be confused with var. *graminea*. Actually, then, the well-marked geographic isolates have been separated out as varieties, and the remainder included in var. *graminea*. The latter, therefore, is of necessity the most plastic variety and includes many incipiently variable plants as well as the numerous, intermediate forms.

The variety *platyphylla* of the Gulf and south-central states is easily recognized by the recurved pistillate pedicels. It probably arose as a result of hybridization between *S. graminea* and *S. montevidensis* subsp. *calycina*, with subsequent introgression with *S. graminea*. It shows signs of being intermediate in bract, filament, and achene characteristics and has pistillate pedicels which resemble those of *S. montevidensis*. In all other respects it approaches *S. graminea*. A narrow-leaved form in Alabama has been called *S. mohrii* but is not tenable as a taxon.

The var. *teres* of Cape Cod, Long Island, and the pine barrens of New Jersey shows differences that come close to being specific. The small, fully connate bracts, the crenate-winged achenes, and the peculiar spongy-terete phyllodia are all quite distinct.

The var. *weatherbiana* of the southeastern coastal plain is less distinctive. In general it is larger in all respects than var. *graminea*. Its unique production of leaves in the fall and the early spring flowering and fruiting make it seem worthy of separation.


a
b
c
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e
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l
m
n
o
S. graminea
▼ var. platyphylla
● var. teres
▽ var. weatherbiana
○ var. cristata
□ var. chapmani
x var. macrocarpa
SCALE
0 100 200 300 400 MILES
0 200 400 600 KILOMETERS
100
95
90
85
80
WEST LONGITUDE
75
40
35
30
25

11

The var. *chapmani* of Florida, Georgia, and Alabama is easily recognized by its elongate bracts, branching scapes, and small receptacles and achenes. Its mode of branching at times resembles that of some species of *Alisma* and *Echinodorus*, in that as many as five whorls may have the pedicels replaced by branches.

The var. *macrocarpa* of the Carolinas is distinguished mainly by the large, crenate-crested achenes and, to a lesser degree, by the spatulate leaf-shape.

The var. *cristata* of the northwestern Great Lakes region has a geographic distribution approaching that of a subspecies, for it has in large measure replaced var. *graminea* throughout its range. The short, basal phyllodia in association with the long-petioled, small-bladed emersed leaves, the large, crested achenes, and the filaments longer than the anthers are all distinctive.

The other previously proposed species here included in synonymy are probably ecological forms of *S. graminea*. They include the small, sterile, phyllodial plants of eastern, tidal waters (*S. eatoni*); the husky southern plants with horizontal rhizomes (*S. cycloptera*); the plants with tapering, terete phyllodes of southern lakes having a marked seasonal drop of water level (*S. isoetiformis*) and the elongate phyllodial plants of moving waters (*S. edwardsiana*). Another plant limited to the Cumberland plateau of northeastern Alabama is worthy of mention, although it has never been separated from *S. graminea*. It is unique in having elongate rhizomes that produce a series of phyllodia along their entire length in contrast to the typical apical crown of leaves. In general it resembles other flowing-water forms of *S. graminea* and pending further study has not been separated from that species. *S. lancifolia* var. *angustifolia* of Grisebach is based on mixed collections of Wright in Cuba and in large part must be considered as *S. graminea*, although it is included in the synonymy of *S. lancifolia* as well.

11. Sagittaria lancifolia L. Syst. Nat. ed. 10. 2: 1270. 1759.

Perennial with well-developed rhizomes. Leaves typically emersed with linear to ovate or elliptical blades 12–35 × 0.7–19 cm, the rare submerged leaves modified into stiff, terete phyllodia to 50 cm long, the petioles to 100 cm long. Scape overtopping the leaves, 40–210 cm long, simple with 5–12 whorls of flowers or frequently branching at the lowest whorl. Bracts thickened, more or less joined at the base, striate to papillose, elongate, 0.5–3.5 cm long. Pedicels ascending, 1–5 cm long. Sepals reflexed, striate to papillose, 0.5–1 cm long; petals white, about twice as long as the sepals. Stamens large and numerous, the linear pubescent filaments 1.5–5 mm long, the oblong anthers 1–2.7 mm long. Mature receptacle 1–1.8 cm in diameter; achenes narrowly obovate to falcate, 1.5–2.3 × 0.8–1.2 mm, the dorsal wings 0.3–0.4 mm wide, occasionally somewhat inflated, the ventral wings 0.15 mm or less wide, the faces with 0–2 low wings or rarely with a resin duct, the obliquely inserted, thick-based beaks 0.3–0.7 mm long.

1. Bracts and sepals more or less striate-ribbed; plants of South America, West Indies, and peninsular Florida. 11a. subsp. *lancifolia*.
1. Bracts and sepals more or less papillose; plants of Central America, and the coastal plain regions of Mexico and eastern United States. 11b. subsp. *media*.

Explanation of Figure 11

FIG. 11. Distribution of the varieties of *S. graminea*. a–c, var. *platyphylla*. a, achene, × 3. b, bracts, × ⅔. c, stamen, × 3. d–f, var. *teres*. d, achene, × 3. e, bracts, × 1. f, stamen, × 3. g–i, var. *weatherbiana*. g, achene, × 3. h, bracts, × ⅔. i, stamen, × 3. j–l, var. *cristata*. achene, × 3. k, bracts, × ⅔. l, stamen, × 3. m, n, var. *chapmani*. m, achene, × 3. n, bracts, × ⅔. o, var. *macrocarpa*, achene, × 3.

11a. Sagittaria lancifolia subsp. lancifolia

Sagittaria pugioniformis L. Pl. Surin. 15. 1775.
Sagittaria acutifolia L. f. Suppl. Sp. Pl. 419. 1781.
Sagittaria ovata Redouté, Liliaceae 7: 411. 1813.
Sagittaria angustifolia Lindl. Bot. Reg. 14: *pl. 1141.* 1828.
Sagittaria sellowiana Kunth, Enum. Pl. 3: 159. 1841.
Sagittaria lancifolia var. *angustifolia* (Lindl.) Griseb. Cat. Pl. Cuba 218, p.p. 1866.
Sagittaria lancifolia var. *major* Micheli in DC. Monogr. Phan. 3: 73. 1881.

Plant somewhat larger throughout. Leaves with linear to ovate blades. Bracts (0.6–)1–3.5 cm long, striate. Sepals striate or ribbed. Stamens with filaments 2–5 mm long, the anthers 1–2.7 mm long. (FIG. 15a-c.)

Type collection: Linnaeus based his name on Plumier's and Browne's descriptions of West Indian plants. No type exists although several specimens annotated by Linnaeus are in the Linnaean herbarium.

Distribution: Tropical and semi-tropical New World, from the estuary of the Amazon River northerly along the coast to Colombia, throughout the West Indies into peninsular Florida and the southern coastal islands of Georgia. The common *Sagittaria* of Florida and the West Indies, more or less sporadic in South America, in shallow waters of swamps and lakes mostly along the coast. Collections examined from Brazil, British Guiana, Colombia, and Dutch Guiana in South America; Bahama Islands, Cuba, Dominican Republic, Haiti, Jamaica, and Puerto Rico in the West Indies; Florida and Georgia in the United States. (FIG. 15.)

11b. Sagittaria lancifolia subsp. media (Micheli) Bogin, comb. nov.

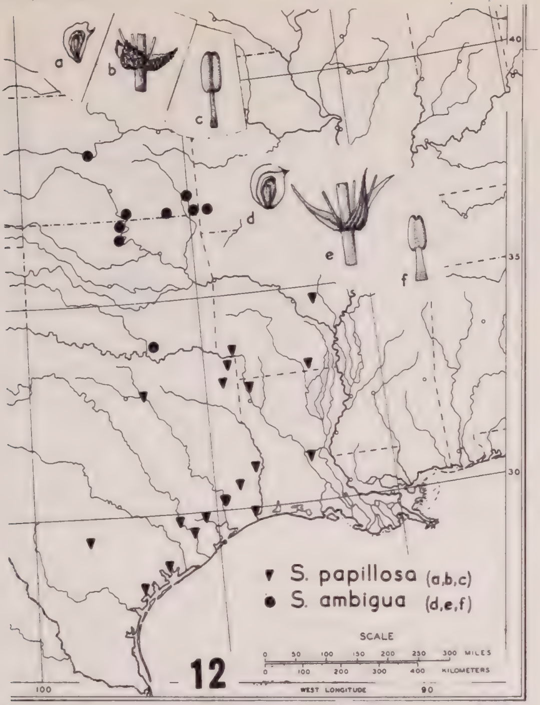
Sagittaria falcata Pursh, Fl. Am. Sept. 2: 397. 1814.
Sagittaria plantaginifolia Martens & Gal. Bull. Acad. Brux. 9(2): 379. 1842.
Sagittaria lancifolia var. *media* Micheli in DC. Monogr. Phan. 3: 73. 1881.
Sagittaria lancifolia var. *falcata* (Pursh) J.G.Sm. Mem. Torrey Club 5: 25. 1894.

Plant somewhat smaller throughout. Leaves with lanceolate to ovate blades. Bracts 0.5–1.5 cm long, papillose. Sepals more or less papillose. Stamens with filaments 1.5–3.5 mm long, the anthers 1–2.2 mm long. (FIG. 15d.)

Type collection: *Drummond 376*, New Orleans, Louisiana (lectotype, not seen, Paris; isolectotypes GH, MO). The only available collection of var. *media* cited by Micheli and characteristic of the subspecies is the lectotype here selected. Unfortunately the specimens of *Drummond 376* in the Gray Herbarium were not seen by Micheli, while the Missouri one is fragmentary, so the lectotype selected is the specimen at Paris, of which a fragment has been seen.

Distribution: North American mainland from Panama to Mexico, north along the Gulf and Atlantic coastal plains to Delaware. In fresh water swamps, ponds and streams, occasionally in the fresh to brackish waters of tidal marshes, especially in the north. Collections examined from British Honduras, Canal Zone, Costa Rica, Guatemala, Nicaraugua, and Panama in Central America; Campeche, Oaxaca, Tabasco, Tamaulipas, and Vera Cruz in Mexico; Alabama, Delaware, Florida, Georgia, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Texas, and Virginia in the United States. (FIG. 15.)

Sagittaria lancifolia is the common species of the semitropical and warm-temperate Atlantic coastal areas of North America. Its closest relationship is with *S. graminea,* sharing with that species the pubescent filaments and non-sagittate leaves. Typically with falcate achenes, thickish, ribbed, or papillose bracts, and large stamens with linear, pubescent filaments, it is quite distinct and easily recognized. It probably hybridizes with *S. graminea,* and the intermediate forms that result have usually been included by American botanists in


a
b
c
d
e
f
40
35
30
▼ S. papillosa (a,b,c)
● S. ambigua (d,e,f)
SCALE
0 50 100 150 200 250 300 MILES
0 100 200 300 400 KILOMETERS
100
WEST LONGITUDE
90
12

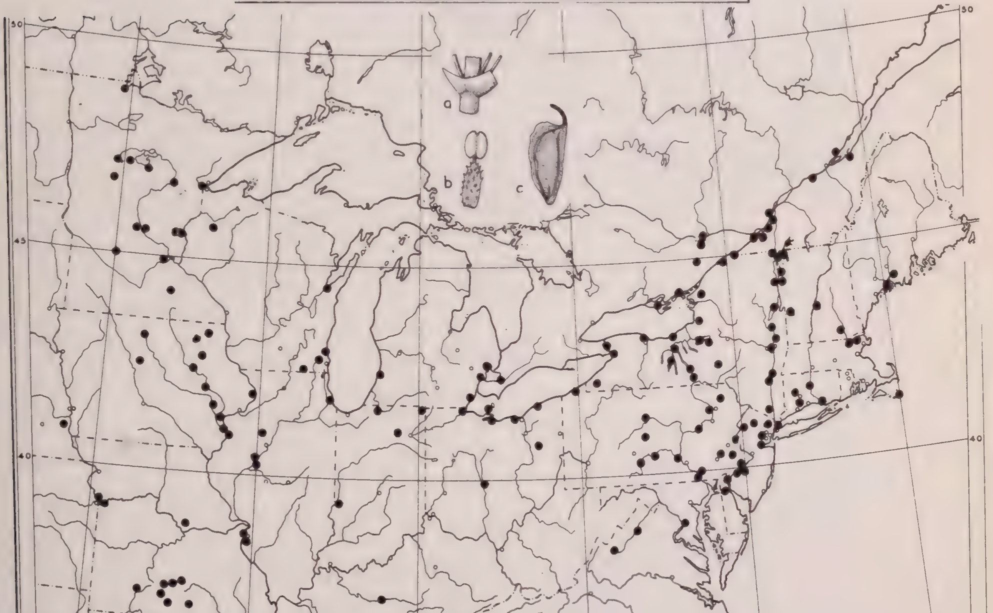
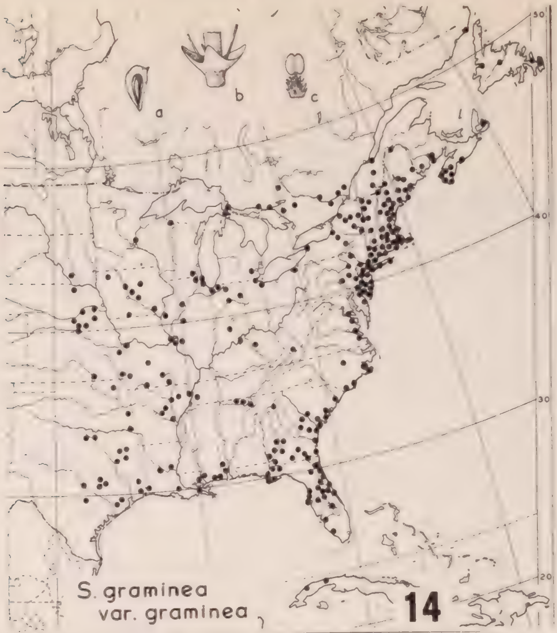
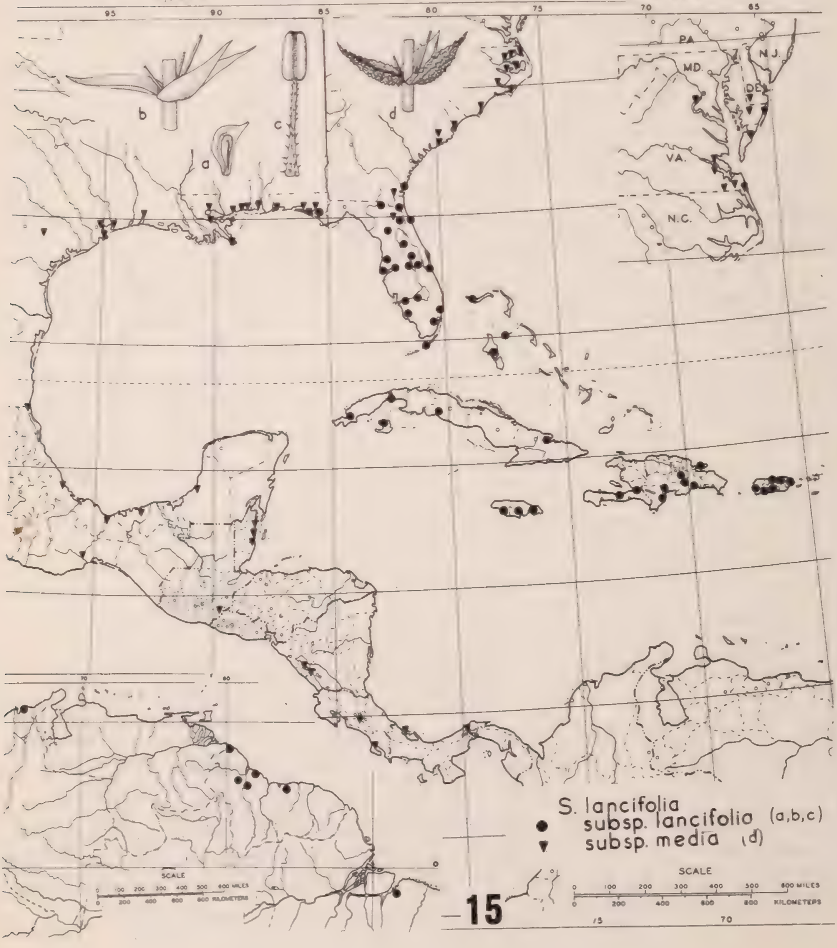

50
45
40
35
a
b
c
13
S. rigida

FIG. 12. Distribution of two species of *Sagittaria* from the south central United States. a–c, *S. papillosa*. a, achene, × 3. b, bracts, × 1. c, stamen, × 3. d–f, *S. ambigua*. d, achene, × 3. e, bracts, × ⅔. f, stamen, × 3. FIG. 13. Distribution of *S. rigida*. a, bracts, × ⅔. b, stamen, × 3. c, achene, × 3.


a
b
c
50
40
30
20
S. graminea
var. graminea

14


95
90
85
80
75
70
65
b
a
c
d
PA
N.J.
MD.
DE.
VA.
N.C.
70
60
0
SCALE
S. lancifolia
● subsp. lancifolia (a,b,c)
▼ subsp. media (d)
SCALE
MILES
KILOMETERS
75
70

15

S. angustifolia Lindl. The actual *angustifolia* is a terete, stiffly narrow-phyllodial form of South America, which if maintained as a separate species would be named *S. pugioniformis* L. as was discussed earlier under *S. rhombifolia.* As in other species of *Sagittaria,* the remainder of the synonymy has resulted from the wide distribution and variable leaf-shape of *S. lancifolia.*

The two subspecies maintained here are readily separated on the basis of bract and sepal characteristics and correlated geographical distribution. However, intermediates commonly occur in the areas where the subspecies overlap and occasionally far removed from these overlapping regions. Fassett (in litt.) proposes a new taxon, var. *calculosa,* for these intermediates; however, this proposal is not adopted here since this taxon has no definite range and its maintenance would only produce many additional intermediates. The present writer includes such plants in the subspecies within whose range they were collected.

12. Sagittaria papillosa Buch. Abh. Nat. Ver. Brem. 2: 27. 1868.

Sagittaria lancifolia var. *papillosa* (Buch.) Micheli in DC. Monogr. Phan. 3: 74. 1881.
Sagittaria trachysepala Engelm. ex Micheli in DC. Monogr. Phan. 3: 74. 1881. Nomen nudum.

Perennial with short thick rhizome. Leaves emersed with linear to narrowly lanceolate blades 7–25 × 0.4–2 cm, the petioles 10–40 cm long. Scape 30–90 cm long, with 5–10 whorls of flowers, typically branching from the lowest whorl. Bracts ovate, moderately connate, densely papillose, 0.3–0.7 cm long. Pedicels short, to 1.5 cm long. Sepals 0.4–0.6 cm long, somewhat papillose, reflexed. Petals white, ca. twice as long as the sepals. Stamens 15–21, the linear glabrous filaments 0.8–1.6 mm long, ca. equaling the subglobose anthers. Mature receptacle 0.6–1.0 cm in diameter; achenes cuneate, small, 1.1–1.5 × 0.7–1 mm, the remotely crested dorsal wing ca. 0.2 mm wide, the ventral wing somewhat narrower, the faces unadorned, the short, broad-based, more or less recurving beak to 0.2 mm long, laterally inserted about one-third down the achene-body. (FIG. 12a-c.)

Type collection: *Drummond 423,* Texas (holotype, not seen, University of Göttingen; isotypes GH, MO).

Distribution: Extreme south-central United States; fairly common in swamps, bogs, and small ponds. Collections examined from Arkansas, Louisiana, Texas. (FIG. 12.)

Sagittaria papillosa is most closely related to *S. ambigua,* and both probably evolved from the *S. graminea-S. lancifolia* group, with which they share the non-sagittate leaf-shape in addition to all the key characteristics of the subgenus *Sagittaria.* The main difference is that *S. papillosa* and *S. ambigua* have glabrous filaments while all species of the *S. graminea* group have pubescent filaments.

S. papillosa is often confused with *S. lancifolia* subsp. *media* since they commonly occur together in portions of their range. Both have papillose bracts and sepals and a similar vegetative appearance. They are quite distinct, however, in achenial and the above-mentioned filament characteristics. The short, stubby rhizome of *S. papillosa* is often covered with the dried leaf-base remnants of previous years which give it a unique bulbous appearance.

13. Sagittaria ambigua J.G.Sm. Missouri Bot. Gard. Rep. 6: 22. 1894.

Perennial with rhizomes and/or runners and corms. Leaves emersed with lanceolate to ovate blades 5–20 × 1–6 cm, the petioles 15–35 cm long. Scapes

Explanation of Figures 14, 15

FIG. 14. Distribution of *S. graminea* var. *graminea.* a, achene, × 3. b, bracts, × 1. c, stamen, × 3. FIG. 15. Distribution of *S. lancifolia.* a–c, subsp. *lancifolia.* a, achene, × 3. b, bracts, × 1. c, stamen, × 3. d, bracts of subsp. *media.* × 1.

simple with 3–10 whorls of flowers, rarely branching at the lowest whorl. Bracts linear, 1–3 cm long, remotely papillose, scarcely joined at the base, the free ends often recurving. Pedicels ascending, 1–2.5 cm long. Sepals 0.5–0.7 cm long, reflexed, remotely papillose. Petals white, less than twice as long as the sepals. Stamens 15–21, the linear glabrous filaments 1–1.5 mm long, equaling or somewhat exceeding the subglobose anthers. Mature receptacle 0.8–1.2 cm in diameter; achenes oblong, 1.8–2.1 × 1.3–1.5 mm, narrowly winged, the faces 1-winged, the laterally inserted minute beak to 0.15 mm. (FIG. 12d-f.)

Type collection: 1875, *G. D. Butler s.n.*, 'Indian Territory' probably Oklahoma (lectotype MO). Smith did not designate a type in his original description of *S. ambigua*. He did cite a number of collections however, most of which are now missing from the herbaria in which he worked. The selected lectotype was cited and annotated by Smith and is characteristic of the species.

Distribution: Southern Great Plains; sporadic in sloughs, swamps, and ponds. Collections examined from Kansas, Missouri, Oklahoma. (FIG. 12.)

A not too common plant most closely related to *S. papillosa*, differing from that species in its larger, winged-faced achenes and its remotely papillose, elongate bracts. The two species have distinct and separate ranges which approach each other but apparently never overlap. No intermediate forms have been seen, although they are to be expected. If such intermediates do exist, there may be reasonable justification for reducing *S. ambigua* to a subspecies of *S. papillosa*.

14. Sagittaria macrophylla Zucc. Ahb. Bayr. Acad. 1: 289. 1832.

Sagittaria mexicana Steud. Nom. ed. 2. 2: 491. 1841.

Perennial with short, small rhizome and elongate runners. Leaves emersed with lanceolate to ovate blades 8–20 × 1.5–7 cm, frequently with 1 or 2 basal lobes to 8 cm long and 2 cm wide. Scape simple with 2–5 distant whorls of flowers. Bracts 1–2 cm long, at first strongly connate and membranous, at length nearly free and thickish. Pistillate flowers with thickish, recurved pedicels (ascending in youth) 4–15 cm long; sepals more or less reflexed, 0.7–1 cm long; petals ca. twice as long; stamens frequently present, non-functional, in a ring. Staminate flowers with 18–∞ stamens, the glabrous, gradually tapering filaments 2.5–3.3 mm long, the oblong anthers 1.8–2.1 mm long. Mature receptacle 1–1.3 cm in diameter; achenes obovate, 2.8–3.1 × 2–2.5 mm, the dorsal wing ca. 0.6 mm wide, somewhat wider than the ventral wing, the erect, subapical, thick-based beak 0.3–0.7 mm long, variously curved. (FIG. 9b-d.)

Type collection: *Karwinski s.n.*, Mexico (holotype, not seen, presumably at Munich; frag. of holotype MO).

Distribution: Mexico; apparently limited to the region around Mexico City, there, on the basis of the numerous collections, locally abundant in lakes and ponds. (FIG. 9.)

A peculiar species of extremely limited range, *S. macrophylla* is unique in several respects. It is apparently related to the sagittate-leaved members of the subgenus *Sagittaria* and at the same time shows unmistakable affinities with the subgenus *Lophotocarpus*. It resembles *S. latifolia* and its allies in the more or less reflexed sepals, glabrous filaments, and sagittate leaves. The thickened, recurved pistillate pedicels and general bract characteristics are close to those of *S. montevidensis*. The remarkable length of the pistillate pedicels is unique, as are the characters of the achenes. The fact that the pistillate flower frequently bears a ring of non-functional stamens leads the writer to believe that the species is intermediate between the two subgenera.

This plant has been known under the name of *S. mexicana* Steud. on the basis that *S. macrophylla* Zucc. was a later homonymn of *S. macrophylla* Bunge, which itself is a synonym of *S. sagittifolia.* This belief was based on the misconception that Bunge's publication dates from 1831 instead of 1833.

15. Sagittaria latifolia Willd. Sp. Pl. **4**: 409. 1805.

Plant glabrous or variously pubescent. Perennial with rhizomes and/or runners and corms. Leaves emersed or submerged, the emersed occasionally linear to ovate, mostly sagittate with linear to ovate-triangular blades 3–26 × 0.7–26 cm, the basal lobes 2–24 × 0.5–15 cm, linear to ovate-triangular, the submerged rare, modified into linear phyllodia to 60 cm long, the petioles to 100 cm long. Scape 15–80 cm long, with 2–7(–10) whorls of flowers, occasionally branching from the lowest whorl. Bracts 0.4–0.9(–1.5) cm long, boat-shaped, joined at the base or nearly free. Pedicels ascending, 0.5–6 cm long. Sepals reflexed, 0.5–1.1 cm long. Petals white, ca. twice as long as the sepals. Stamens 21–∞, the glabrous more or less linear filaments 1–3.7 mm long, the oblong anthers 1–2.3 mm long. Mature receptacle 1–2.5 cm in diameter; achenes obovate, 2.5–4 × 1.5–2.5 mm, the occasionally crested dorsal wing 0.4–0.8 mm wide, the ventral wing somewhat narrower, the faces with a resin duct and/or a low rib, or frequently unadorned, the gradually tapering, laterally inserted beak 0.6–1.6 mm long.

1. Plant glabrous throughout; widespread. 15a. var. *latifolia.*
1. Plant more or less pubescent throughout; southeastern United States. 15b. var. *pubescens.*

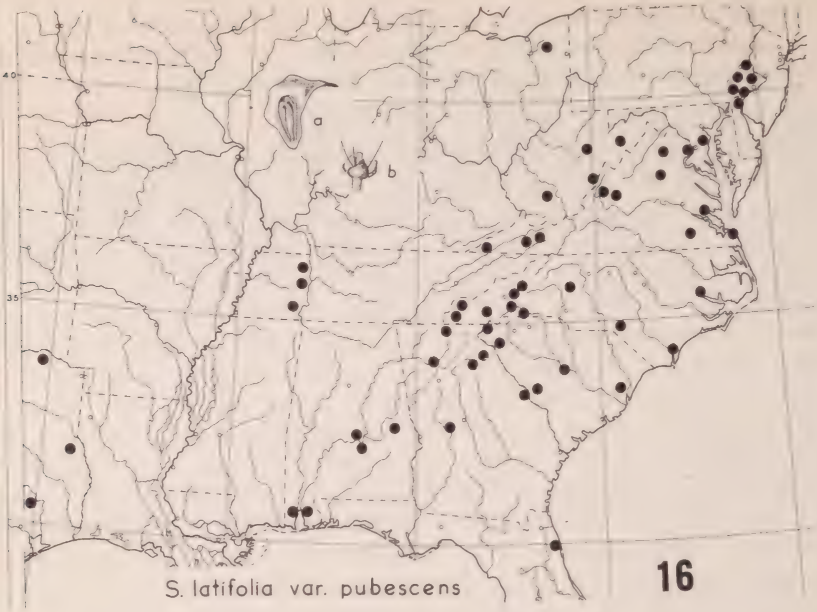
15a. Sagittaria latifolia var. latifolia.

Sagittaria obtusa Muhl. ex Willd. Sp. Pl. **4**: 409. 1805.
Sagittaria sagittifolia var. *latifolia* (Willd.) Muhl. Cat. 86. 1813.
Sagittaria latifolia var. *major* Pursh, Fl. Am. Sept. **2**: 396. 1814.
Sagittaria hastata Pursh, Fl. Am. Sept. **2**: 396. 1814.
Sagittaria gracilis Pursh, Fl. Am. Sept. **2**: 396. 1814.
Sagittaria simplex Pursh, Fl. Am. Sept. **2**: 397, p.p. 1814.
Sagittaria sagittifolia var. *gracilis* (Pursh) Torr. Comp. 355. 1826.
Sagittaria sagittifolia var. *hastata* (Pursh) Torr. Comp. 355. 1826.
Sagittaria sagittifolia var. *macrophylla* Hook. Fl. Bor. Am. **2**: 167. 1840.
Sagittaria sagittifolia var. *vulgaris* Hook. Fl. Bor. Am. **2**: 167. 187. 1840.
Sagittaria variabilis Engelm. in A. Gray, Man. Bot. 461. 1848.
Sagittaria variabilis var. *angustifolia* Engelm. in A. Gray, Man. Bot. ed. 2. 439. 1856.
Sagittaria variabilis var. *diversifolia* Engelm. in A. Gray, Man. Bot. 439. ed. 2. 1856.
Sagittaria variabilis var. *gracilis* (Pursh) Engelm. in A. Gray, Man. Bot. ed. 2. 439. 1856.
Sagittaria variabilis var. *sagittifolia* Engelm. in A. Gray, Man. Bot. 439. ed. 2. 1856.
Sagittaria variabilis var. *hastata* (Pursh) Engelm. in A. Gray, Man. Bot. ed. 5. 493. 1867.
Sagittaria sagittifolia var. *variabilis* (Engelm.) Micheli in DC. Monogr. Phan. **3**: 69, p.p. 1881.
Sagittaria latifolia var. *glabra* Buch. Pflanzenreich 4(15): 50. 1903.
Sagittaria esculenta Howell, Fl. NW. Am. **1**: 679. 1903.
Sagitta latifolia (Willd.) Nieuwl. Am. Midl. Nat. **3**: 22. 1913.
Sagittaria latifolia var. *obtusa* (Muhl.) Wieg. Rhodora **27**: 186. 1925.
Sagittaria ornithorhyncha Small, Man. SE. Fl. 25. 1933.
Sagittaria planipes Fernald, Rhodora **49**: 106. 1947.
Sagittaria sagittifolia Auct. non L.

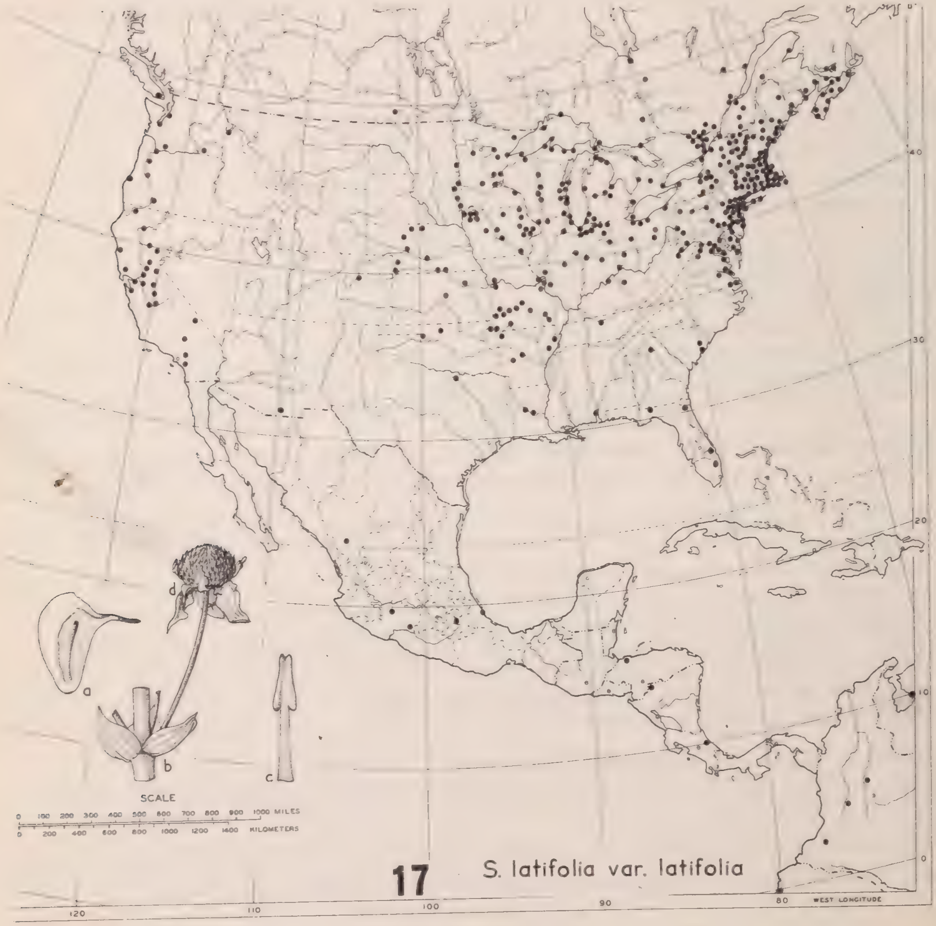
Plant glabrous throughout. (FIG. 17a-d.)

Type collection: *Muhlenberg s.n.*, 'Canada' (holotype, not seen, presumably at Berlin; frag. of holotype US).

Distribution: Cold-temperate Canada, south to northwestern South America; absent in the Rocky Mountains, sporadic in the southeastern United States, in-



S. latifolia var. pubescens **16**


40
30
20
10
0
a
b
c
d
SCALE
0 100 200 300 400 500 600 700 800 900 1000 MILES
0 200 400 600 800 1000 1200 1400 KILOMETERS
120
110
100
90
80
WEST LONGITUDE

17 S. latifolia var. latifolia

cluding the southern Appalachian Mountains, and in all semitropical and tropical latitudes. Probably not indigenous to the West Indies but introduced there as well as in the Hawaiian Islands. The most common and wide-spread New World species, found in extremely diverse aquatic habitats throughout its range. Collections examined from North America: Canada (British Columbia, New Brunswick, Nova Scotia, Ontario, Prince Edward Island, Quebec, Saskatchewan); United States (all states except Mississippi, North Carolina, and Tennessee, where in all probability it does exist, and Montana, Nevada, New Mexico, Utah, and Wyoming); Mexico (Durango, Michoacán, Puebla, Vera Cruz); Central America (Costa Rica, Honduras, Nicaragua); West Indies (Puerto Rico). South America (Colombia, Ecuador, Venezuela). Hawaii. (FIG. 17.)

15b. Sagittaria latifolia var. **pubescens** (Muhl.) J.G.Sm. Mem. Torrey Club 5: 25. 1894.

Sagittaria pubescens Muhl. Cat. 86. 1813.
Sagittaria sagittifolia var. *pubescens* (Muhl.) Torr. Comp. 356. 1826.
Sagittaria variabilis var. *pubescens* (Muhl.) Engelm. in Gray, Man. Bot. ed. 5. 493. 1867.

Plant sparsely stellate-pubescent throughout, the bracts and sepals sparsely to densely pubescent. Leaves emersed, sagittate, the mostly obtuse blades ovate-triangular. Achene beak 1 mm or more long. (FIG. 16a, b.)

Type collection: *Muhlenberg s.n.*, Pennsylvania (holotype not seen, presumbaly Berlin). No other pubescent or papillose *Sagittaria* is present in Pennsylvania; therefore the identity of Muhlenberg's plant is reasonably certain.

Distribution: Pennsylvania and Ohio, south to Florida and Alabama, west to Texas. In diverse aquatic habitats; replacing var. *latifolia* to a large extent, especially in the mountains; sporadic west of the Mississippi River and along the Gulf Coast. Collections examined from Alabama, Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, West Virginia. (FIG. 16.)

The common widespread New World *Sagittaria* characterized by typically sagittate, emersed leaves, which assume a bewildering number of ecological variations, which in turn have given rise to wide synonymy. Except for var. *pubescens*, which has a few fixed differences and a correlated distribution, none of the other taxa previously proposed can be justified. Differences that seem fixed in one locality vary tremendously in another; key characteristics will occasionally differ on plants of the same clone or on the same plant at different times of the year. Certain characteristics, however, which safely serve to distinguish the species, remain reasonably static, including the boat-shaped bracts and the large achenes with laterally inserted beaks of various lengths.

Sagittaria latifolia is closely related to *S. cuneata* and *S. engelmanniana*, sharing with these species a common range, typically sagittate, emersed leaves and glabrous filaments. There is probably some hybridization between *S. latifolia* and these species, since occasional intermediates exist. The absence of large numbers of intermediates, except as discussed below, suggests that these species do not hybridize readily. West of the Mississippi River, where the ranges of *S. latifolia* and *S. engelmanniana* subsp. *brevirostra* coincide, numerous intermediates

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Explanation of Figures 16, 17

FIG. 16. Distribution of *S. latifolia* var. *pubescens*. a, achene, × 3. b, bracts, × ⅔.
FIG. 17. Distribution of *S. latifolia* var. *latifolia*. a, achene, × 3. b, bracts, × ⅔. c, stamen, × 3. d, mature pistillate flower, × ⅔.

have been collected. Although these collections were made throughout the growing season, none of them seem to bear mature achenes, which suggests hybrid-sterility.

The starchy, large winter-storage corm was extensively used as food by the North American Indians. In California the Chinese and Japanese probably still use them as vegetables. This may explain its presence in the Hawaiian Islands where it is well established although previously misidentified as *S. sagittifolia* L. The plant was probably introduced there by some of the numerous orientals who settled in Hawaii after discovering that California was not their land of opportunity.

16. **Sagittaria longiloba** Engelm. ex Torr. in J.G.Sm. Missouri Bot. Gard. Rep. 6: 16. 1894.

Sagittaria sagittifolia var. *mexicana* Martens & Gal. Bull. Acad. Roy. Brux. 9(2): 379. 1842.
Sagittaria sagittifolia var. *variabilis* (Engelm.) Micheli in DC. Monogr. Phan. 3: 69, p.p. 1881.
Sagittaria greggii J.G.Sm. Missouri Bot. Gard. Rep. 6: 17. 1894.

Perennial with rhizomes and/or runners with corms. Leaves emersed, sagittate, with linear to ovate-triangular blades 3–15 × 1.3–10 cm, the linear to lanceolate basal lobes 8–21 × 0.6–7 cm, always longer than and commonly twice as long as the blades, the petioles 35–75 cm long. Scapes 35–140 cm long, with 4–12 whorls of flowers, commonly branching at the lowest whorl. Bracts linear, elongate, 0.8–5 cm long, joined at the base, the free ends often reflexed. Pedicels 1–3.5 cm long, ascending. Sepals 0.4–0.7 cm long, reflexed. Petals white, ca. twice the length of the sepals. Stamens 15–∞, the glabrous, linear filaments 2–3 mm long, exceeding the nearly linear anthers. Mature receptacle 0.7–1.2 cm in diameter; achenes obovate, 1.2–2.3 × 0.6–1.3 mm, the narrow dorsal wing to 0.3 mm wide, the ventral wing nearly obsolete, the faces commonly 1-winged, the short, triangular, laterally inserted beak to 0.15 mm long, or obsolete. (FIG. 19a-c.)

Type collection: *Gunnison Expedition 49*, 'Western Texas' (holotype NY; isotype GH). Although the collection label is marked Western Texas, field notes state 'Upper Arkansas (River)'; therefore the plant probably was collected in Colorado. Engelmann proposed *S. longiloba* for Torrey's *Botany of the Mexican Boundary Survey*. Torrey in a footnote in that work described the plant and credited Engelmann with the name, at the same time stating that the plant was not distinct and failing to maintain it. Therefore, although published and adequately described, the name was not validly published until J. G. Smith included it in his revision of the genus.

Distribution: Nebraska and California, south to Mexico, but absent in the Rocky Mountains and the Great Basin. A common plant of the southern Great Plains and Mexico, in the shallow waters of sloughs, swamps, ponds, and ditches. Collections examined from Arizona, California, Colorado, Kansas, Nebraska, Oklahoma, and Texas in the United States, and Guanjuato, Michoacán, Oaxaca, Querétaro, Sinaloa, Sonora, and Tamaulipas in Mexico. (FIG. 19.)

One of the few species of *Sagittaria* with relatively constant leaf-shape, *S. longiloba* is easily recognized by the elongate basal lobes of the invariably sagittate leaves. It is related to *S. latifolia* and other members of the subgenus with glabrous filaments and sagittate leaves. The short, laterally inserted beaks of the rather small achene are quite distinctive.

Sagittaria greggii J.G.Sm. is here included in synonymy on the basis of similar vegetative and floral characteristics. It is not given varietal or subspecific rank, even though, to a degree, the Californian and Mexican plants on which Smith based his name are larger throughout, since the key characteristics of bract-size, blade and basal lobe ratios, and achene-differences show no geographical correlation and intermediates are commonly found throughout the entire range.

17. Sagittaria engelmanniana J.G.Sm. Mem. Torrey Club 5: 25. 1894.

Perennial with rhizomes and/or runners with corms. Leaves emersed, occasionally linear to lanceolate, typically sagittate with linear to ovate attenuate or obtuse blades 4.5–20 × 0.2–12 cm, the linear to ovate deltoid or attenuate basal lobes 4–18 × 0.1–8 cm, the petioles 10–60 cm long. Scape 20–80 cm long or longer, with 2–12 whorls of flowers, occasionally branching at the lowest whorl. Bracts distinct, 0.5–3 cm long or longer, linear to lance-attenuate, firm or membranous. Pedicels ascending, 0.7–3.5 cm long. Sepals 0.4–0.7 cm long, reflexed. Petals white, nearly twice as long as the sepals. Stamens numerous, the slender glabrous filaments 1–2.7 mm long, the oblong anthers 1–2 mm long. Mature receptacle 1–2.5 cm in diameter, often markedly echinate; achenes obovate or cuneate-obovate, 2.3–4 × 1.6–3 mm, the broad dorsal wing 0.4–1 mm wide, often crested, the ventral wing 0.3–0.6 mm wide, the faces 0–3-winged, the erect or recurving obliquely to apically inserted broad-based beak 0.5–2 mm long.

1. Mature receptacle markedly echinate; scape typically simple.
    2. Bracts shorter than the pedicels; scape 2–4-whorled; bog plant of coastal regions. 17a. subsp. *engelmanniana*.
    2. Bracts equal to or exceeding the pedicels; scape more than 4-whorled; inland and southern plant. 17b. subsp. *longirostra*.
1. Mature receptacle not echinate; scape often branched; northern and western plant. 17c. subsp. *brevirostra*.

17a. Sagittaria engelmanniana subsp. **engelmanniana**

Sagittaria variabilis var. *gracilis* S. Wats. in A. Gray, Man. Bot. ed. 6. 555, p.p. 1889.
Sagitta engelmanniana (J.G.Sm.) Nieuwl. Am. Midl. Nat. 3: 22. 1913.

Leaves emersed, occasionally linear or lanceolate, typically sagittate, with linear or lance-attenuate, rarely elliptical blades 4.5–10 × 0.2–2 cm, the basal lobes linear to lance-attenuate. Scapes with 2–4 whorls of flowers. Bracts more or less membranous, 0.5–1.2 cm long. Pedicels 1.5–3.5 cm long. Receptacle echinate, 1–1.8 cm thick; achenes cuneate-obovate, 2.5–4 × 1.5–3 mm, the faces 1–3-winged, the obliquely ascending beak (0.7–)1–2 mm long. (FIG. 18a-c.)

Type collection: September 1864, *Robbins s.n.,* sphagnum bog, Uxbridge, Worcester Co., Massachusetts (holotype MO; isotype GH).

Distribution: Massachusetts to New Jersey, sporadic along the coast to South Carolina; common especially northward in bogs and acid waters of ponds and streams. Collections examined from Connecticut, Dealware, Maryland, Massachusetts, New Jersey, New York, Rhode Island, South Carolina, Virginia. (FIG. 18.)

17b. Sagittaria engelmanniana subsp. **longirostra** (Micheli) Bogin, comb. nov.

Sagittaria sagittifolia var. *longirostra* Micheli in DC. Monogr. Phan. 3: 69. 1881.
Sagittaria longirostra (Micheli) J.G.Sm. Mem. Torrey Club 5: 26. 1894.
Sagittaria variabilis var. *echinocephala* Engelm. ex J.G.Sm. Missouri Bot. Gard. Rep. 6: 16. 1894. Nomen nudum.
Sagittaria longirostra var. *australis* J.G.Sm. in Mohr, Bull. Torrey Club 24: 20. 1897.
Sagittaria australis (J.G.Sm.) Small, Fl. SE. U.S. 46. 1903.

Leaves sagittate, with ovate-deltoid obtuse blades 3–13 × 2.5–10 cm, the basal lobes broad. Scape with 5–12 whorls of flowers. Bracts firm, 0.7–2.5 cm long. Pedicels 0.7–2.3 cm long. Receptacle 1–1.5 cm thick, echinate; achenes obovate, 2.3–3.2 × 1.6–2.3 mm, the faces 0–2-winged, the obliquely inserted beak (0.7–)1–1.5 cm long, strongly recurved. (FIG. 18d, e.)

Type collection: 1832, *Drummond s.n.*, Alabama (holotype, not seen, K; fragment of holotype MO). Judging from the fragment, the holotype is juvenile but characteristic.

Distribution: New York to Indiana, south to the Gulf States; common, especially in the Appalachian Mountains, in lakes, ponds, and swamps, rarely in acid water. Collections examined from Alabama, Delaware, Georgia, Indiana, Kentucky, Maryland, Mississippi, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, West Virginia. (FIG. 18.)

17c. **Sagittaria engelmanniana** subsp. **brevirostra** (Mack. & Bush) Bogin, comb. nov.

Sagittaria brevirostra Mack. & Bush, Missouri Bot. Gard. Rep. **16**: 102. 1905.

Leaves sagittate, with mostly lanceolate blades 5–20 × 2–8 cm, the basal lobes linear to lanceolate. Scapes branched, with 5–12 whorls of flowers. Bracts firm, 1–3 cm long or longer. Pedicels 1.3–2.5 cm long. Receptacle 1.5–2.5 cm thick; achenes cuneate-obovate, 2.3–2.7 × 1.6–1.9 mm, the faces 0–1-winged, the ascending apically inserted beak 0.5–1 mm long. (FIG. 18 f, g.)

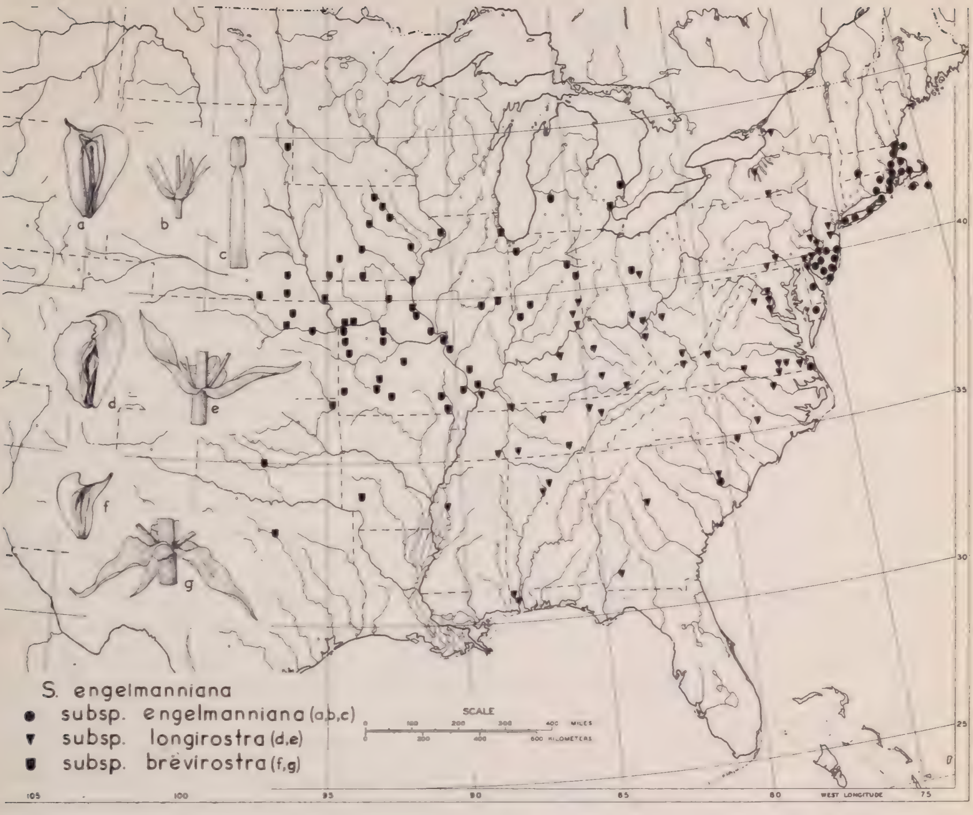
Type collection: *Bush 1917*, Courtney, Jackson Co., Missouri (lectotype MO; isolectotype GH, US). Mackenzie and Bush cited *Bush 1917* and *2175* in their original description of *S. brevirostra*. The lectotype is the more characteristic and is better represented in herbaria.

Distribution: Ohio and Michigan, west to South Dakota, south, west of the Mississippi, to Texas; in sloughs, swamps, and ponds. Collections examined from Arkansas, Indiana, Illinois, Iowa, Kansas, Michigan, Missouri, Nebraska, Ohio, Oklahoma, South Dakota, Texas. (FIG. 18.)

An interesting member of the subgenus *Sagittaria* with typically sagittate leaves and glabrous filaments, *S. engelmanniana* is closely related to *S. latifolia* and *S. cuneata*. It probably hybridizes with both of these species to some extent. At one time the entire species was included in the catch-all *Sagittaria variabilis* Engelm. In the last 50 years, however, three species have been proposed and maintained by most authors. These are not maintained here because of their specific similarities in all key characteristics and the numerous intermediates that have been collected. Reducing them to a subspecific level is justified since the extremes of each population are quite distinct and each has a correlated geographic and ecological distribution.

The subspecies *engelmanniana* is limited to bogs and acid waters along the Atlantic coastal plain. Typically it has linear leaves that are sagittate or lobeless (possibly an ecological response to high acidity), membranous bracts, echinate receptacles, and a few-whorled scape. Vegetatively, it resembles *S. latifolia* in the same habitats to a remarkable degree. Some intermediates between these two have been seen, suggesting hybridization. It is commonly found associated with *S. graminea* var. *teres*. A completely intergradating series between subsp. *engelmanniana* and subsp. *longirostra* is demonstrated by *Godfrey & Tryon 1477* and *1477½*, both of which represent a single collection.

The subspecies *longirostra*, with its broadly sagittate leaves, strongly recurved-beaked achenes, and bracts equaling or exceeding the pedicels, replaces subsp. *engelmanniana* inland and southward. However, in portions of the coastal plain, swarms of intermediates can only hesitantly be separated. Several collections of plants from the Finger Lake district of New York, closely resembling subsp.


a
b
c
d
e
f
g
S. engelmanniana
● subsp. engelmanniana (a,b,c)
▼ subsp. longirostra (d,e)
■ subsp. brevirostra (f,g)
SCALE
0 100 200 300 400 MILES
0 200 400 600 KILOMETERS
40
35
30
25
105
100
95
90
85
80
WEST LONGITUDE
75

18

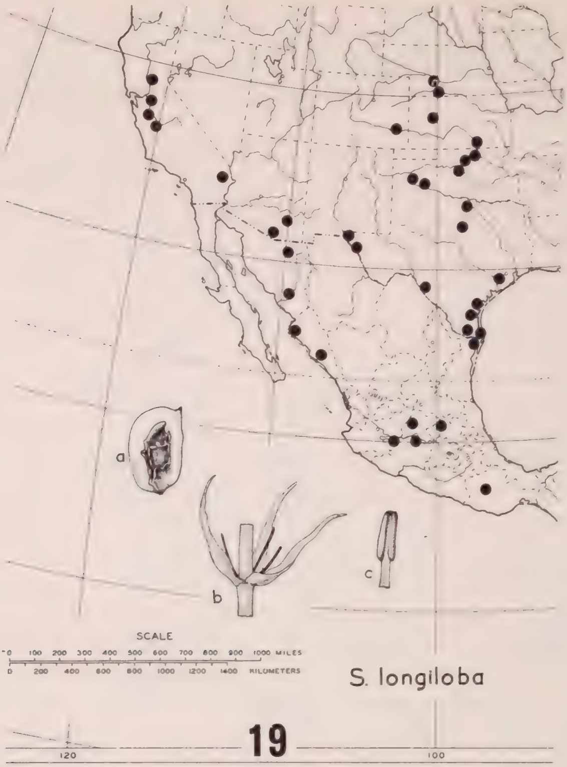
FIG. 18. Distribution of *S. engelmanniana*. a–c, subsp. *engelmanniana*. a, achene, × 3. b, bracts, × ⅔. c, stamen, × 3. d, e, subsp. *longirostrata*. d, achene, × 3. e, bracts, × ⅔. f, g, subsp. *brevirostra*. f, achene, × 3. g, bracts, × ⅔.

engelmanniana, have been arbitrarily placed in subsp. *longirostra* solely on the basis of range and ecology.

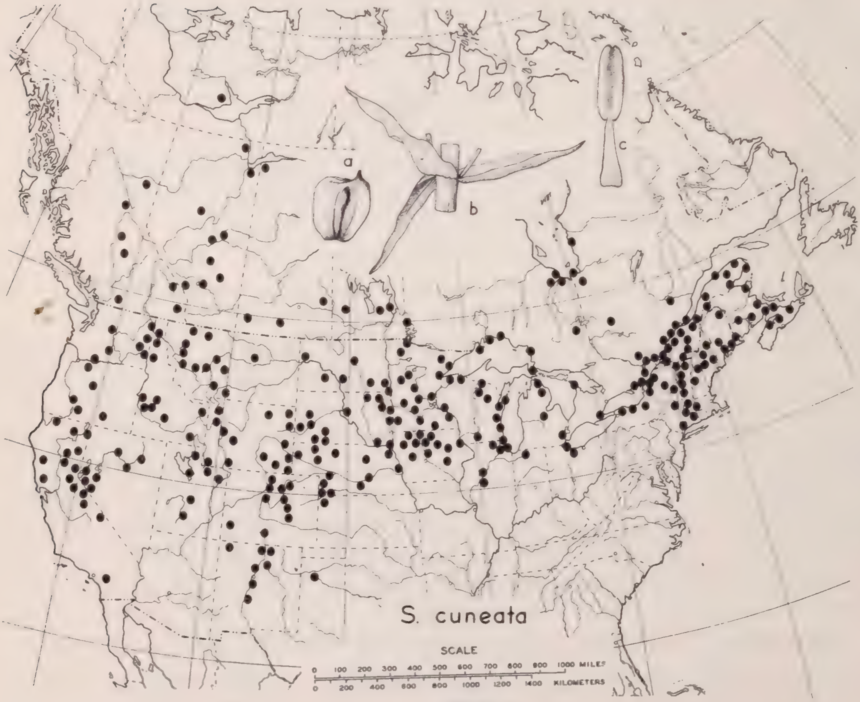
Westward and northward subsp. *longirostra* is replaced by subsp. *brevirostra*. This group is characterized by mostly branched scapes, large, non-echinate receptacles, and generally smaller achenes. Intermediates frequently occur along the common border of this subspecies and subsp. *longirostra*. Subsp. *brevirostra* apparently hybridizes with *S. latifolia* as discussed earlier. In the northwest portion of its range it commonly occurs with *S. cuneata*, and there is some evidence that it has hybridized with that species. Indeed the shortened beak in subsp. *brevirostra* and the branched scape of *S. cuneata* in this area may have resulted from hybridization and subsequent gene-flow from one population to the other.

18. Sagittaria cuneata Sheldon, Bull. Torrey Club 20: 283. 1893.

Sagittaria sagittifolia var. *minor* Pursh, Fl. Am. Sept. **2**: 395. 1814.
Sagittaria variabilis var. *hastata* Macoun, Cat. Canad. Pl. **4**: 77, p.p. 1888.


a
b
c
SCALE
0 100 200 300 400 500 600 700 800 900 1000 MILES
0 200 400 600 800 1000 1200 1400 KILOMETERS
S. longiloba
120
100

19


a
b
c
S. cuneata
SCALE
0 100 200 300 400 500 600 700 800 900 1000 MILES
0 200 400 600 800 1000 1200 1400 KILOMETERS

20

Sagittaria arifolia Nutt. ex J.G.Sm. Missouri Bot. Gard. Rep. **6**: 6. 1894.
Sagittaria arifolia var. *stricta* J.G.Sm. Missouri Bot. Gard. Rep. 6: 8. 1894.
Sagittaria arifolia var. *aquatilis* J.G.Sm. Missouri Bot. Gard. Rep. 9: 156. 1898.
Sagittaria hebetiloba A. Nels. Bull. Torrey Club **26**: 6. 1899.
Sagittaria paniculata Blankin. Mont. Coll. Sci. Stud. Bot. **1**: 40. 1905.
Sagittaria arifolia var. *tenuor* Blankin. Mont. Agr. Coll. Sci. Stud. Bot. **1**: 40. 1905.
Sagittaria arifolia var. *cuneata* (Sheld.) Lunell, Bull. Leeds Herb. **1**: 3. 1907.
Sagittaria arifolia var. *dimorpha* Lunell, Bull. Leeds Herb. **1**: 3. 1907.
Sagittaria arifolia var. *monomorpha* Lunell, Bull. Leeds Herb. **1**: 3. 1907.
Sagittaria arifolia var. *polymorpha* Lunell, Bull. Leeds Herb. **1**: 3. 1907.
Sagittaria hitchcockii Gandoger, Bull. Soc. Bot. Fr. **66**: 294. 1919.
Sagittaria suksdorfii Gandoger, Bull. Soc. Bot. Fr. **66**: 294. 1919.

Perennial with runners and corms. Leaves emersed, floating, or submerged. Emersed leaves sagittate, with lanceolate to ovate deltoid blades 2.5–17 × 1.5–11 cm, the deltoid basal lobes 0.7–11 × 0.7–6 cm, the floating leaves commonly cordate, rarely linear to ovate, the submerged leaves modified into ribbon-shaped phyllodia to 45 cm long, the petioles 5–70 cm long. Scape 10–50 cm or more long, with 2–8 whorls of flowers, occasionally branching at the lowest whorl. Bracts more or less membranous, joined at the base, (0.4–)0.7–3.5 cm long, lance-attenuate or acute. Pistillate pedicels ascending, 0.5–2 cm long, the staminate somewhat longer. Sepals reflexed, 0.4–0.8 cm long. Petals white, ca. 1.5 times as long as the sepals. Stamens 15–24, the glabrous subulate filaments 0.8–2 mm long, about equaling the oblong anthers. Mature receptacle 0.8–1.5 cm in diameter; achenes obovate, 1.8–2.6 × 1.3–2 mm, the prominent rounded dorsal wing to 0.8 mm wide, exceeding the strongly rounded ventral wing, the faces plain, or with a low slender rib, the apical subulate erect beak 0.1–0.4 mm long. (FIG. 20a-c.)

Type collection: Aug. 1892, *Sheldon s.n.*, East Battle Lake, Ottertail Co., Minnesota (holotype Minn.; isotypes GH, MO, NY, UC, US).

Distribution: Subarctic Canada, south to New England, New York, Great Lakes, Iowa, Kansas, Texas, New Mexico, Arizona, and California. The plant is widespread on calcareous and muddy shores and the shallow waters of diverse freshwater habitats, occasional in tidal waters. *S. cuneata* is the common species of Canada and the northern United States and the only *Sagittaria* of the Rocky Mountains and the Great Basin. Collections examined from Alberta, British Columbia, Manitoba, New Brunswick, Nova Scotia, North West Territory, Ontario, Quebec, and Saskatchewan in Canada, and Arizona, California, Colorado, Connecticut, Idaho, Illinois, Indiana, Iowa, Kansas, Maine, Massachusetts, Michigan, Minnesota, Montana, Nebraska, Nevada, New Hampshire, New Mexico, New York, North Dakota, Ohio, Oregon, South Dakota, Texas, Utah, Vermont, Washington, Wisconsin, and Wyoming in the United States. (FIG. 20.)

Sagittaria cuneata is extremely plastic vegetatively but relatively constant florally. It is immediately recognized in maturity by the unique round-winged achenes with short, erect beaks. It is the only temperate New World species with cordate floating leaves.

Its closest relationships are with *S. latifolia* and *S. engelmanniana* in the New World and *S. sagittifolia* in the Old World. Until relatively recent times *S. cuneata* probably formed a circumboreal species with the latter. Indeed there still may be some justification for considering it a subspecies of *S. sagittifolia*. The key differences between the two are quite well defined and show no variation within their

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Explanation of Figures 19, 20

FIG. 19. Distribution of *S. longiloba*. a, achene, × 3. b, bracts, × ⅔. c, stamen, × 3.
FIG. 20. Distribution of *S. cuneata*. a, achene, × 3. b, bracts, × 1. c, stamen, × 7.

correlated geographic ranges. No intermediates have been seen or reported; however, the two plants react similarly to edaphic surroundings and remarkably similar vegetative responses have been seen in both. The achenes of each are very much alike, differing mainly in size (being generally larger in the Old World), but the bracts are markedly different in the two species.

In the absence of mature achenes, accurate separation of juvenile specimens of *S. cuneata* and *S. latifolia* has been extremely difficult. The surest means of identity is the bract-differences; *S. latifolia* has a boat-shaped bract somewhat firm in texture, while *S. cuneata* has a somewhat membranous lance-attenuate bract. Like *S. engelmanniana, S. cuneata* until comparatively recently was included in *S. variabilis.* Since its separation, however, a formidable synonymy has developed based entirely on vegetative differences. The careful observations of Lunell, along with excellent companion collections represented in many herbaria, demonstrate the wide edaphic responses of the same plant to varying conditions, and clearly show the futility of giving taxonomic rank to vegetative variations. The large winter-storage organs were sought as food by American Indians, especially in the Northwestern States, and with those of *S. latifolia* were included in the Indian name "Wapato."

19. Sagittaria sagittifolia L. Sp. Pl. 993. 1753.

Sagittaria minor Mill. Gard. Dict. ed. 8. 1768.
Sagitta major Scop. Fl. Carn. ed. 2. 2: 239. 1772.
Sagittaria natans Pallas, Reise 3: 77. 1778.
Sagittaria monoica Gilib. Fl. Lith. 2: 218. 1782.
Sagittaria obtusa Thunb. Fl. Jap. 242. 1784.
Sagittaria sagittata Thunb. Fl. Jap. 242. 1784.
Sagittaria vulgaris Gueldens. Reisen Russ. 2: 45. 1791.
Sagittaria alpina Willd. Sp. Pl. 4: 410. 1805.
Vallisneria bulbosa Poir. in Lam. Encyc. 7: 321, p.p. 1808.
Sagittaria heterophylla Schreb. in Schweigg. & Korte, Fl. Erl. 2: 119. 1811.
Sagittaria sinensis Sims, Bot. Mag. *pl. 1631.* 1814.
Sagittaria acuminata J.E.Sm. in Rees, Cyc. 31: no. 4. 1814.
Sagittaria aquatica S. F. Gray, Nat. Arr. Br. Pl. 2: 216. 1821.
Sagittaria aquatica var. *minor* (Mill.) S. F. Gray, Nat. Arr. Br. Pl. 2: 216. 1821.
Sagittaria hastata Don, Prodr. Fl. Nep. 22. 1825.
Sagittaria doniana Sweet, Hort. Brit. 375. 1826.
Sagittaria sagittifolia var. *tenuior* Wahl. Fl. Suec. 2: 621. 1826.
Sagittaria hirundinacea Blume, Enum. Pl. Jav. 34. 1827.
Sagittaria hermaphrodita Ham. in Wall. Cat. 175. 1832. Nomen nudum.
Sagittaria macrophylla Bunge, Mem. Sav. Etr. 2: 147. 1833.
Sagittaria edulis Schlecht. Linnaea 18: 432. 1844.
Sagittaria alpina var. *emersa* Turcz. Bull. Soc. Imp. Nat. Mosc. 27(3): 58. 1854.
Sagittaria alpina var. *submersa* Turcz. Bull. Soc. Imp. Nat. Mosc. 27(3): 58. 1854.
Sagittaria sagittifolia var. *longiloba* Turcz. Bull. Soc. Imp. Nat. Mosc. 27(3): 58. 1854.
Sagittaria sagittifolia var. *vallisneriifolia* Coss. & Godr. Fl. Fr. 3: 167. 1855.
Sagittaria sagittifolia var. *stratiotoides* Bolle, Verh. Bot. Ver. Mark. Brand. 3: 164. 1861.
Sagittaria sagittifolia var. *breviloba* Reg. Mem. Acad. St.-Petersb. 7(4): 154. 1862.
Sagittaria sagittifolia var. *minor* (Mill.) Reg. Mém. Acad. St.-Petersb. 7(4): 154. 1862.
Sagittaria sagittifolia var. *subaequilonga* Reg. Mém. Acad. St.-Petersb. 7(4): 154. 1862.
Sagittaria sagittifolia var. *edulis* (Schlecht.) Sieb. ex. Miq. Ann. Mus. Lugd. Bot. 2: 138. 1865.
Sagittaria sagittifolia var. *aequiloba* Schur, Enum. Pl. Transsil. 630. 1866.
Sagittaria sagittifolia var. *heterophylla* (Schreb.) Schur, Enum. Pl. Transsil. 630. 1866.
Sagittaria sagittifolia var. *divaricata* Schur, Enum. Pl. Transsil. 630. 1866.
Sagittaria sagittifolia var. *leucopetala* Miq. Ill. Fl. Arch. Ind. 49. 1870.
Sagittaria tenuior (Wahl.) Gandoger, Fl. Lyonn. 226. 1875.
Sagittaria sagittifolia var. *diversifolia* Micheli in DC. Monogr. Phan. 3: 66. 1881.

Sagitta aquatica (S. F. Gray) St. Lager in Cariot Etudes Fl. ed. 8. 2: 819. 1899.
Sagitta palustris Bub. Fl. Pyren. 4: 4. 1891.
Sagittaria aginashi Makino, Bot. Mag. Tok. 15: 104. 1901.
Sagittaria hyperborea Laest. ex. Lindb. Medd. Soc. Faun. Fl. Fenn. 27: 66. 1901. Nomen nudum.
Sagittaria septentrionalis Laest. ex. Lindb. Medd. Soc. Faun. Fl. Fenn. 27: 66. 1901. Nomen nudum.
Sagittaria leucopetala (Miq.) Bergm. Vasti Pl. Rot. 479. 1924.
Sagittaria triflora Auct. non L.

Perennial with runners and corms, rarely with rhizomes. Leaves emersed, floating, or submerged, the emersed sagittate leaves with linear to ovate deltoid blades 3–16 × 0.3–7 cm, the linear to lanceolate deltoid basal lobes 2–20 × 0.2–4 cm, the floating leaves linear to oblong, rarely cordate, the submerged modified into linear flattened phyllodia to 30 cm long or longer, the petioles 10–100 cm long. Scape 10–100 cm long, with 2–10 whorls of flowers, occasionally branching at the lowest whorl. Bracts free or joined at the base, more or less firm, lanceolate, 0.3–1.5 cm long. Pistillate pedicels ascending 0.5–1.5 cm long, occasionally nearly sessile, those of the staminate flowers typically longer and somewhat thinner. Sepals reflexed, 0.4–0.7 cm long. Petals white, typically with base purple-spotted, ca. twice the length of the sepals. Stamens numerous, the glabrous, linear filaments 1–2 mm long, usually exceeding the linear to ovate anthers. Mature receptacle 1–2 cm in diameter; achenes obovate to nearly orbicular, 2.5–4.5 × 1.6–3.5 mm, the broad dorsal wing to 1.3 mm wide, ca. twice as wide as the ventral wing, the faces unadorned or with a single resin duct, the apical erect beak 0.2–0.8 mm long. (FIG. 3a-c.)

Type locality: Europe. A number of collections from Europe and Asia, annoted by Linnaeus, are present in the herbarium of the Linnean Society.

Distribution: Europe and Asia, absent only in the more arid regions. *S. sagittifolia* grows in a wide range of aquatic habitats from the subarctic to the tropics. This *Sagittaria* is the common species of the Old World and the only member of the genus throughout a great part of its range. Collections examined from Austria, Belgium, Denmark, England, Finland, Germany, Hungary, Ireland, Italy, Netherlands, Norway, Russia, Sweden, and Switzerland in Europe and from Assam, Afghanistan, Burma, China, Formosa, India, Indochina, Indonesia, Japan, Korea, Manchuria, Mongolia, Pakistan, Philippines, Ryukyu Islands, Siam, and Siberia in Asia. (FIG. 3.)

The glabrous filaments and sagittate emersed leaves show the close relationship between *S. sagittifolia* and the *S. latifolia* group of the New World. It is also closely related to the only other Old World species of the subgenus, *S. pygmaea*.

An extremely variable species vegetatively, *S. sagittifolia* responds to temperature and water-level changes in much the same manner as *S. cuneata*. The entire subarctic and alpine portion of the species, with almost exclusively floating or submerged leaves and generally smaller achenes, has regularly been separated as *S. natans* Pallas. After close study of the available material and after critically comparing it to the very similar New World *S. cuneata*, the present writer can find no basis for maintaining *S. natans* on any taxonomic level. The only other taxon presently maintained by authors, but here included in synonymy, is var. *leucopetala*. This is a warm-temperate or tropical segregate from East Asia with all-white petals but certainly no other distinguishing characteristics. The balance of the numerous proposed taxa, resulting from the vegetative variability and the wide distribution, have previously been reduced to synonymy by other students of the genus.

20. Sagittaria pygmaea Miq. Ann. Mus. Lugd. Bot. 2: 138. 1865.

Sagittaria sagittifolia var. *oligocarpa* Micheli in DC. Monogr. Phan. 3: 68. 1881.
Hydrolirion coreanum H. Lev. Repert. Sp. Nov. 9: 67. 1912.
Blyxa bulbosa H. Lev. Repert. Sp. Nov. 9: 67. 1912. Nomen nudum.
Sagittaria altigena Hand.-Mazz. ex. Samuelss. in Hand.-Mazz. Symb. Sin. 7: 1187. 1936. Nomen nudum.

Probably annual. Leaves mostly submerged, rarely emersed, the emersed with linear scarcely distinguishable blades to 3.5 cm long and 0.7 cm wide, their petioles to 15 cm long, the submerged modified into ribbon-shaped, occasionally spatulate phyllodia 8–12 cm long. Scape 10–20 cm long, with 1–3 whorls of flowers. Bracts nearly free, elliptical, 0.3–0.5 cm long. Pistillate pedicels sessile or subsessile, the staminate 1.5–3 cm long. Sepals 0.4–or 0.5 cm long, reflexed. Petals white, nearly twice as long as the sepals. Stamens 9–15, the glabrous subulate filaments ca. 1 mm long, slightly exceeding the oblong anthers. Mature receptacle ca. 0.5 cm in diameter; achenes obovate or nearly orbicular, 1.5–2 × 1.2–1.7 mm, the crested, more or less toothed dorsal wing to 0.6 mm wide, exceeding the ventral wing, the faces unadorned, the laterally inserted filiform beak to 1.2 mm long. (FIG. 4a-c.)

Type collection: *Pierot* 72, submerged in rice field, Kyushu, Japan (holotype Leyden).

Distribution: Eastern Asia. This dwarf usually submerged annual is apparently fairly common in rice paddies and shallow lakes in warm-temperate coastal regions. Collections examined from China, Korea, Japan. (FIG. 4.)

This unique Old World species is closely related to *S. sagittifolia* and probably hybridizes with that plant, as is demonstrated by the occasionally collected intermediates (*S. potamogetifolia* Merrill). The toothed-crested achenes and the sessile pistillate flowers are distinctive.

SPECIES EXCLUDENDAE VEL DUBIAE

Sagittaria bonaer Larranaga, Escrit. Larr. 2: 258. 1923. Nomen nudum.
Sagittaria braziliensis Mart. Syst. Mat. Med. Veg. Braz. 47. 1843. (=*Echinodorus*.)
Sagittaria brevipedicellata Kuntze, Rev. Gen. 3(2): 327. 1898. (=*Echinodorus*.)
Sagittaria cerifera Larranaga, Escrit. Larr. 2: 258. 1923. Nomen nudum.
Sagittaria cerulea Raf. Fl. Ludov. 18. 1817. Nomen nudum. (=*Pontederia*.)
Sagittaria cordifolia Lam. Encyc. 2: 504. 1788. (=*Echinodorus*.)
Sagittaria gigantea Vilm. Fl. Pl. Terre ed. 1. 759. 1865. (A horticultural form of *S. lancifolia*.)
Sagittaria humilis Kuntze, Rev. Gen. 3(2): 326. 1898. (=*Echinodorus*.)
Sagittaria japonica Vilm. Fl. Pl. Terre ed. 3. 1002. 1870. (A horticultural form of *S. sagittifolia*.)
Sagittaria oblonga Larranaga, Escrit. Larr. 1: 1. 1922. (=*Echinodorus*?)
Sagittaria obtusifolia L. Sp. Pl. 993. 1753. (=*Limnophyton*.)
Sagittaria ovifolia Larranaga, Escrit. Larr. 1: 189. 1922. (Not Alismataceae.)
Sagittaria palaefolia Nees & Mart. Nova Acta Acad. Leop.-Carol. 11: 21. 1823. (=*Echinodorus*.)
Sagittaria potamogetifolia Merr. Sunyatsenia 1: 189. 1934. (Probable hybrid, *S. pygmaea* × *S. sagittifolia*.)
Sagittaria radicans Nutt. Trans. Am. Philos. Soc. 5: 159. 1837. (=*Echinodorus*.)
Sagittaria ranunculoides Vell. Fl. Flum. 10. 1827. (=*Hydrocleis*.)
Sagittaria ranunculoides Kuntze, Rev. Gen. 3(2): (=*Echinodorus*.)
Sagittaria rostrata Kuntze, Rev. Gen. 3(2): 1898. (=*Echinodorus*.)
Sagittaria sagittifolia Vell. Fl. Flum. 10. 1827. (=*Echinodorus*.)
Sagittaria subulata Klotsch ex Schomb. Faun. Fl. Br. Gui. 1117. 1848. Nomen nudum. (=*Echinodorus*?)
Sagittaria tenella Kuntze, Rev. Gen. 3(2): 1898. (=*Echinodorus*.)

Sagittaria triandra Dalz, Hook. Kew Jour. 2: 144. 1859. = *Wisneria.*
Sagittaria trifolia L. Sp. Pl. 993. 1753. (= *Ranunculus?*)
Sagittaria triflora Miq. Fl. Ind. Bat. 3: 239. 1857. (Horticultural form of *Hydrocharis.*)
Sagittaria triquetra Sessé & Moc. Fl. Mex. ed. 2. 218. 1894. (Species dubia.)
Sagittaria viscosa Mohr, Bull. Torrey Club 24: 19. 1897. (Mixed collection of *S. lancifolia* subsp. *media* and *S. latifolia* var. *pubescens.*)

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THE BOTANY OF THE GUAYANA HIGHLAND—PART II

BASSETT MAGUIRE AND JOHN J. WURDACK,
AND COLLABORATORS

Part I[1] of our report on the botany of the sandstone areas of the Guayana Highland was issued in April, 1953. By that time we had visited Tafelberg in Suriname, the Kaieteur Plateau in British Guiana; and, in Venezuela, Ilu-tepuí on the Gran Sabana, Guaiquinima on the Río Paragua, and (in Territorio Amazonas) Cerros Sípapo, Marahuaca, Duida, Huachamacari, Yapacana, Moriche, Parú, Guanay, and Camani. A list of localities, collectors, dates and exsiccatae numbers was provided for The New York Botanical Garden explorations of 1948-1951.

We have continued exploration in the Highland area to the Pakaraima region of British Guiana; to the Gran Sabana; to Cerros Yutaje and Neblina[2] in Venezuelan Amazonas; and to Brazilian Guayana.

In continuation of the data presented in Part I, localities and collector data for additional expeditions conducted in and since 1951, are here listed.

Localities, collectors, dates, and exsiccatae numbers of the 1951-56 expeditions

Cerro Guanay, Territorio Amazonas, Venezuela (expedition of Wm. H. Phelps, Jr).
Bassett Maguire, Kathleen D. Phelps, Charles B. Hitchcock, Gerald Budowski, January 23-February 5, 1951: 31600-31789.

Cerro Camani, Territorio Amazonas, Venezuela (expedition of Wm. H. Phelps, Jr.).
Bassett Maguire, Kathleen D. Phelps, Charles B. Hitchcock, Gerald Budowski, February 12-February 17, 1951: 31790-31831.

Puerto Ayacucho, Territorio Amazonas, Venezuela.
Bassett Maguire, March 4, 1951: 31832-31836.

Santa Barbara, junction of Ríos Orinoco and Ventuari, Territorio Amazonas, Venezuela.
Richard S. Cowan and John J. Wurdack, February 21-February 23, 1951: 32000-32087.

Eagle Mountain and Mt. Ebini, Potaro River, British Guiana.
Bassett Maguire, October 12-October 18, 1951: 32088-32149.

Imbaimadai, Membaru-Kurupung, Kamarang, British Guiana.
Bassett Maguire and F. D. Fanshawe, October 21-November 18, 1951: 32150-32652.

Cerro Bolívar, Estado Bolívar, Venezuela.
Bassett Maguire, December 1-December 2, 1951: 32653-32704.

Río Paragua, Cerro Guaiquinima, Estado Bolívar, Venezuela.
Bassett Maguire, December 7, 1951-January 19, 1952: 32705-33159.

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[1] Mem. N. Y. Bot. Gard. 8: 87-160. 1953.

[2] **Maguire, Bassett.** Cerro de la Neblina, Amazonas, Venezuela: A newly discovered sandstone mountain. Geog. Rev. 45: 27-51. 1955.

Kavanayén, Ilu-tepuí, Gran Sabana, Estado Bolívar, Venezuela.
Bassett Maguire, February 3-April 4, 1952: 33160-33749.

Kavanayén, Ptari-tepuí, Gran Sabana, Estado Bolívar, Venezuela.
Bassett Maguire, John J. Wurdack, Celia K. Maguire, December 11-December 23, 1952: 33750-34015.

Chimantá-tepuí, Gran Sabana, Estado Bolívar, Venezuela.
John J. Wurdack, January 1-February 14, 1953: 34016-34370.

Cerro Bolívar, Estado Bolívar, Venezuela.
John J. Wurdack, February 24-March 2, 1953: 34371-34477.

Cerro Yutaje, Territorio Amazonas, Venezuela.
Bassett Maguire and Celia K. Maguire, January 28-March 10, 1953: 35000-35539.

Alto Río Orinoco, Ríos Casiquiare, Negro and Guainía, Territorio Amazonas, Venezuela.
Bassett Maguire, John J. Wurdack, Celia K. Maguire, March 15-April 24, 1953: 34478-34999; 35540-35736.

Cerro Bolívar and El Pao, Estado Bolívar, Venezuela.
Bassett Maguire and John J. Wurdack, April 30-May 2, 1953; 35737-35809.

Cerro Bolívar, Estado Bolívar, Venezuela.
John J. Wurdack and George S. Bunting, October 18-October 27, 1953: 35810-36030.

Ríos Orinoco, Atabápo, Casiquiare, Guainia, Pacimoni and Yatúa, and Cerro Neblina, Territorio Amazonas, Venezuela.
Bassett Maguire, John J. Wurdack, and George S. Bunting, November 7, 1953-February 18, 1954: 36031-37714.

Serras Tepequem and do Sol (Uei-tepuí), Territorio Rio Branco, Brazil.
Bassett Maguire and Celia K. Maguire, November 19, 1954-January 7, 1955: 40000-40486.

Mt. Ayanganna, Kaieteur Plateau, British Guiana.
Bassett Maguire, W. M. C. Bagshaw, Celia K. Maguire, February 1-February 15, 1955: 40558-40701.

Chimantá-tepuí, Gran Sabana, Estado Bolívar, Venezuela.
Julian S. Steyermark and John J. Wurdack (New York Botanical Garden in cooperation with the Chicago Natural History Museum), January 8-March 16, 1955: 1-1436.

Middle Orinoco, Estados Bolívar and Apure, between Río Pargueni and Cerro Baraguan.
John J. Wurdack and J. V. Monachino, December 3, 1955-January 29, 1956: 39740-39999; 40849-41427.

Reports submitted in the following pages for the most part present studies on all collections made to date for respective families or genera. We are grateful to the specialists who have lent their talents to the review of our materials, and to our botanical colleagues in Venezuela who have lent government facility to our work.

Materials collected during the Chimantá-tepuí expeditions made independently in 1953 by John J. Wurdack and Julian A. Steyermark, and the common expedition conducted by them jointly in 1955, are reported in "Botany of the Chimantá Massif" (Mem. N.Y. Bot. Gard. 9:000-000. 1956). New taxa described in the Chimantá report, when the genus involved is treated herein, are "keyed out" in this paper.

Again we have the pleasure of acknowledging assistance given to us in the prosecution of our activities. Transportation and port facilities have, as in the past, been made available to us by Alcoa Steamship Company, Gulf Oil Corporation, Mene Grande Oil Company, National Bulk Carriers, Inc., and Sinclair Oil and Refining Company. Johnson Motor Company has again provided 15-horsepower and 25-horsepower outboard motors for river exploration. Sears Roebuck and Company continued to furnish equipment and supplies. Parke, Davis and Company maintained our medical supplies at the most efficient level for tropical exploration.

The work of this program continues with the financial support of the National Science Foundation.

MUSCI[3]

Leucobryum martianum (Hornsch.) Hpe.

VENEZUELA: Amazonas: Cerro Duida, Río Cunucunuma. On tree trunk, north escarpment above Culebra, elev. 1400 m, Nov. 20, 1950, *Bassett Maguire, R. S. Cowan & John J. Wurdack 29610A.*

Distribution: Central America, West Indies, northern South America.

The above collection represents a rather striking form without any structural differences but distinguishable at a glance by the purple coloration. I have in the herbarium four other collections from the Cerro Duida region made by Steyermark that show the same distinctive color tinge.

Trichostomum duidense Bartr., sp. nov.

Dioicum, dense caespitosum, caespitibus fuscescenti-viridibus. Caulis erectus, simplex, dense foliosus. Folia sicca valde circinato-incurva, humida erecto-patentia, 3-3.2 mm longa, e basi oblonga paulum latiore sensim lineari-lanceolata, acuta, integerrima; marginibus planis; costa brevissime excurrente, dorso papillosa; cellulis laminalibus minutis, dense papillosis, basilaribus anguste rectangularibus, incrassatis, infimae laxioribus. Seta 13-16 mm longa, tenuissima; theca angustissime cylindrica, erecta vel leniter curvata, 2.5-2.7 mm long, fuscescens. Caetera ignota.

VENEZUELA: Amazonas: Cerro Duida, Río Cunucunuma. On stones, Culebra Creek, elev. 1500-1600 m, Nov. 21, 1950, *Bassett Maguire, R. S. Cowan & John J. Wurdack 29652.*

The long, slender, often slightly curved capsules are distinctive. Unfortunately the fruit is all old and deoperculate so that the peristome characters are not available, but definite vestiges of peristome-teeth have been observed in several of the capsules examined.

GRAMINEAE[4]

Among the grasses of the Guayana Highland, the genus *Myriocladus* is the most remarkable. All the nineteen species known are endemic, and only one, *M.*

---

[3] By Edwin B. Bartram.

[4] By Jason R. Swallen; except *Andropogon* and *Paspalum*, by Ernest R. Sohns, and *Axonopus*, by George Black.

virgatus, has been found on more than one mountain. Six species occur on the Chimantá Massif, three on Cerro Sipapo, two each on the Cerro de la Neblina, Cerro Guaiquinima, Serranía Yutaje, and Cerro Huachamacari, and one each on Cerro Duida, Serranía Parú, Apácara-tepuí, and Churi-tepuí.

Key to species of *Myriocladus*[5]

Blades not more than 17 mm long, 2 mm wide, appressed; inflorescence simple, bearing 3–5 spikelets, usually partly enclosed in the sheath.

Rachilla pilose, the segment above the sterile lemma 1 mm long; internodes below the branches relatively short, mostly 3–4 cm long. 1. *M. gracilis.*

Rachilla glabrous, the segment above the sterile lemma 0.5 mm long; internodes below the branches elongate, 8–12 cm long. 2. *M. steyermarkii.*

Blades very much larger; inflorescence with few to numerous racemes.

Blades narrowly lanceolate, the base nearly as wide as the mouth of the sheath; glumes distinctly awned.

Racemes 2–2.5 cm long; awns of the glumes about as long as the spikelet. 3. *M. virgatus.*

Racemes not more than 1 cm long; awns of the glumes much longer than the spikelet. 4. *M. maguirei.*

Blades broadly rounded, the base usually petiole-like, much narrower than the mouth of the sheath; glumes awnless or short-awned (except in *M. cardonae* with spike-like inflorescence).

Racemes few, usually less than 10.

Panicles dense, 6–8 cm long; fertile lemmas acuminate, the first 8–10 mm long. 5. *M. neblinaensis.*

Panicles open, 10–20 cm long, with slender, distant, ascending to spreading branches.

Culms very slender, 45 cm to 3 m high; blades 5–7 cm long, 5–10 mm wide. 6. *M. simplex.*

Culms relatively coarse, as much as 4 m high; blades 10–11.5 cm long, about 2 cm wide. 7. *M. exsertus.*

Racemes numerous, usually many more than 50.

Inflorescence dense, spikelike, about 1 cm wide, the branches very short, appressed. 8. *M. cardonae.*

Inflorescence open, the branches ascending to spreading.

Panicles lax, the branches very slender, at least some of them more than 10 cm long.

Axis and branches of panicle glabrous, glandular-spotted; fertile floret 4.4 mm long; spikelets glabrous. 9. *M. longiramus.*

Axis and branches of panicle usually densely pubescent; fertile floret not more than 4.3 mm long, usually less; glumes and lemmas distinctly hispidulous at the summit.

Spikelets with 1 fertile floret, purple; lemmas obtuse or subobtuse. 10. *M. affinis.*

Spikelets usually with 2 fertile florets; lemmas acute or subacute. 11. *M. paruensis.*

Panicles rigid, erect, the branches stiffly ascending or spreading.

Panicle-branches densely flowered to the base, simple.

Glumes, at least the second, distinctly awned; blades of fertile culms 26 cm long, 12 cm wide. 12. *M. grandifolius.*

Glumes awnless; blades of fertile culms 9–12 cm long, 6 cm wide. 13. *M. paraquensis.*

Panicle-branches naked at the base or at least the lower ones bearing short, usually divergent branchlets.

Spikelets distant, long-pedicellate, mostly 2–4 on each branch. 14. *M. variabilis.*

Spikelets approximate, short-pedicellate, appressed, usually more than 4 on each branch.

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[5] Not all treated in this report; some are listed in "Botany of the Chimantá Massif" (Mem. N.Y. Bot. Gard. 9:393–439. 1957).

Rachilla-joints conspicuously pilose; glumes attenuate, the tips awn-like, glabrous or scabrous. 15. *M. paludicolus.*
Rachilla-joints glabrous; glumes not awnlike, the tip hispidulous.
  Panicle-branches stiffly and narrowly ascending, the lower ones distinctly longer.
    Flowering culms 1–1.5 m high; panicle-axis and branches glabrous. 16. *M. confertus.*
    Flowering culms about 5 m high; panicle-axis and branches densely pubescent; spikelets with 1–4 fertile florets. 17. *M. distantiflorus.*
  Panicle-branches stiffly spreading, of nearly equal length.
    Spikelets with 2 or 3 fertile florets, purple; first fertile lemma 5 mm long; palea about as long as the lemma, the keels glabrous. 18. *M. purpureus.*
    Spikelets with 1 or 2 fertile florets; first fertile lemma 4–4.5 mm long; palea longer than the lemma, the keels sparsely ciliate. 19. *M. wurdackii.*

3. Myriocladus virgtus Swallen, Fieldiana 28(1): 34. 1950.

VENEZUELA: Savanna Hills, Cerro Duida, Terr. Amazonas, *Julian A. Steyermark 58293* (TYPE). Common in thickets and savanna along left fork of Cano Yutaje, alt. 1300–1400 m, Cerro Yutaje, Río Manapiare, *Bassett Maguire & Celia K. Maguire 35271.* Moist wooded swale, Summit Camp to East Escarpment, alt. 1800 m, Cerro Huachamarcari, Río Cunucunuma, *Bassett Maguire, R. S. Cowan, & John J. Wurdack 30265.*

4. Myriocladus maguirei Swallen, sp. nov. Figure 3b.

Culmi fertiles summo ramis 3, elongatis; vaginae pubescentes, summo marginibus fimbriatae, suprema 15.5 cm longa lamina reducta, ligula exteriore brevissima, minute ciliata; laminae anguste lanceolatae, attenuatae, appressae, usque ad 25 cm longae, ca. 1 cm latae, glabrae; paniculae longi-exsertae, 30–34 cm longae, ca. 2 cm latae, ramis brevibus numerosis adscendentibus vel patentibus, inferioribus distantibus, ad summum condensatis, axe et ramis pubescens; spiculae 4-florae, suprema reducta; glumae quam floribus longiores, subaequales, attenuatae, usque ad 7 mm longae; lemma sterile obtusum, 2–3 mm longum, aristatum, arista 0.5–2 mm longa; lemma fertile primum 3–3.5 mm longum, acutum, marginibus hispido-ciliatum; palea lemma aequans vel superans, summo sparse pilosa vel hispida.

Type specimen consists of the top of a flowering culm with three approximate elongate branches; exposed part of sheaths 2.5–3 cm long, the upper ones longer, the uppermost of the main branch 15.5 cm long with a very much reduced blade, pubescent, with a very short minutely ciliate rim at the summit, the margins fimbriate toward the summit; ligule about 1 mm long, very minutely ciliate; blades as much as 25 cm long, very narrowly lanceolate, attenuate, about 1 cm wide at the widest part, only slightly narrower than the mouth of the sheath, appressed, very scabrous on the margins, otherwise glabrous; inflorescence long-exserted, 30–34 cm long, about 2 cm wide, the numerous short branches stiffly ascending or spreading, the lower ones somewhat distant, becoming crowded upward, the main axis and branches pubescent; spikelets 4-flowered, the upper floret rudimentary, the rachilla-joints very short, the glumes usually exceeding the florets; glumes narrow to rather broad, tapering into awns, equal, or the second longer, as much as 7 mm long; sterile lemma obtuse, 2–3 mm long, the strong midnerve excurrent in an awn 0.5–2.0 mm long; fertile lemma 3–3.5 mm long, acute, the midnerve thickened at the summit, the margins hispid-ciliate, especially near the tip; palea as long as the lemma or slightly longer, sparsely pilose or hispid at the tip, otherwise glabrous.

TYPE: infrequent, pocket thickets, Summit Peak IV, January 3, 1949, Cerro Sipapo, Terr. Amazonas, Venezuela, *Bassett Maguire & Louis Politi 28144;* U.S. National Herbarium No. 2,040,180.

5. **Myriocladus neblinaensis** Swallen, sp. nov. Figure 1.

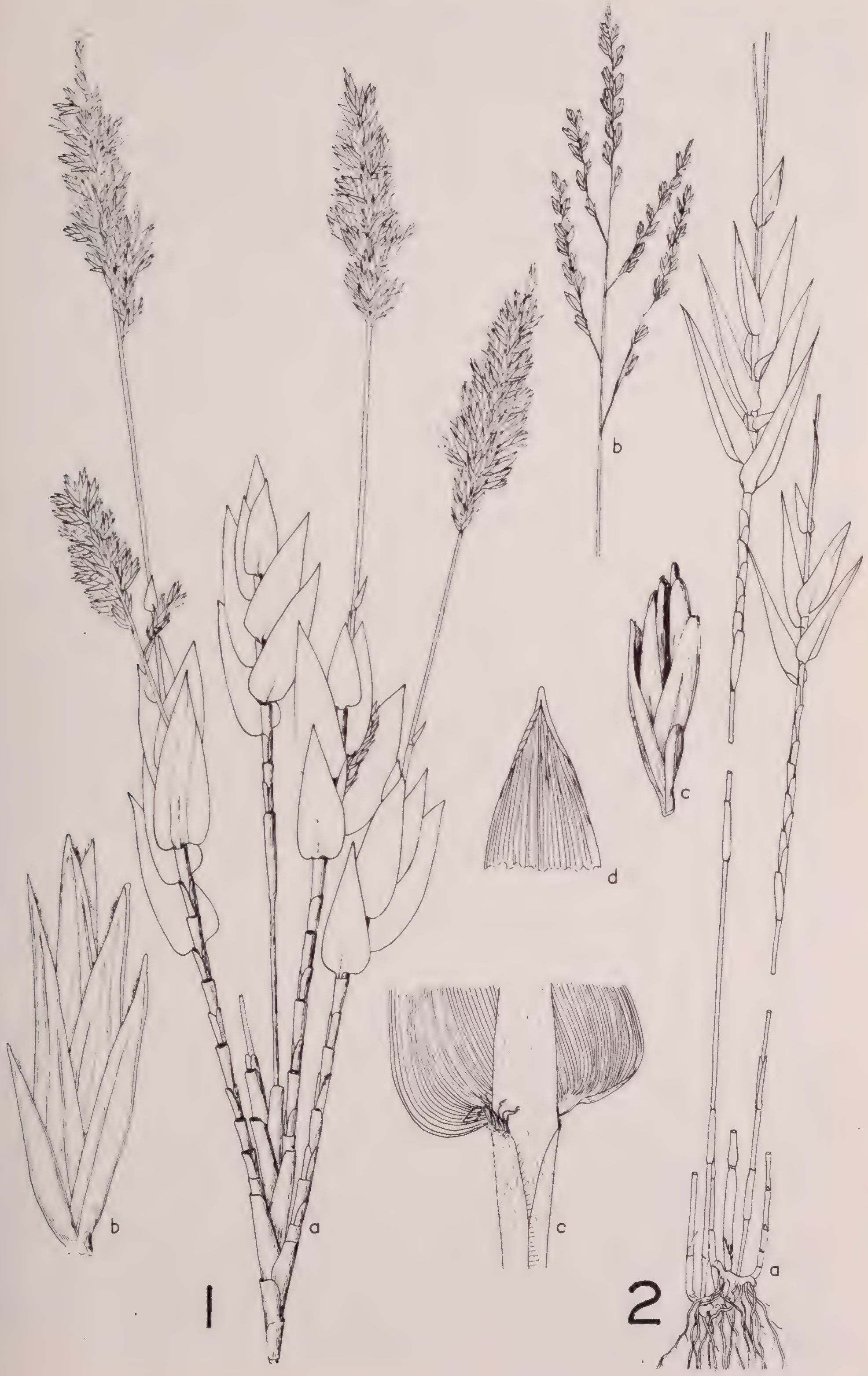
Culmi usque ad 1.5 m alti, rhizomatosi, simplices vel nodiis superioribus ramosi; vaginae dense pubescentes, minute ciliatae, summo ligula exteriore 0.2 mm longa minute ciliata; ramorum primorum laminae 4–6 cm longae, 12–20 mm latae, breve petiolatae, appressae vel adscendentes, acutae, glabrae vel obscure pubescentes, marginibus scabrissimae; ramorum primorum paniculae 6–8 cm longae, 1–2 cm latae, densae, ramis brevibus appressis vel adscendentibus; spiculae 3–4-florae, suprema reducta; rachilla pubescens; glumae acuminatae, sparse pubescentes, marginibus ad summum minute ciliatae, prima 5–7 mm longa, secunda 7–9 mm longa; lemma sterile 8–10 mm longum, acuminatum vel aristatum, pubescens; lemma fertile 9–10 mm longum, acutum vel aristatum, pubescens vel ad basin glabrum, marginibus ciliatum; palea quam lemmate brevior, multo angustior, inter carinam pubescens, carinis hispida, summo truncata, hispida, nerviis excurrentibus.

Culms as much as 1.5 m tall from a rhizomatous base, simple or with few to several branches from the upper nodes, the branches sometimes branching and rebranching, successively with smaller blades and inflorescences, naked below the terminal crowded sheaths or with small series of shortened internodes alternate with long internodes, sometimes with a single branch from each series; branches densely pubescent; exposed portion of sheaths 1–1.5 cm long, densely crisp pubescent, the rim at the summit about 0.2 mm long, very minutely ciliate; blades of the primary branches 4–6 cm long, 12–20 mm wide, acute, abruptly rounded at the base to a short thick petiole, appressed or ascending, glabrous or obscurely pubescent, the margins very scabrous; panicles of the primary branches 6–8 cm long, usually long-exserted, 1–2 cm wide, dense, the short branches appressed or ascending, those of the secondary branches smaller, short-exserted or partly enclosed in the sheath; spikelets 3–4-flowered, the upper floret rudimentary, the fertile florets readily disarticulating, the rachilla pubescent; glumes acuminate, the first 5–7 mm long, rarely shorter, the second 7–9 mm long, sparsely pubescent, the margins minutely ciliate toward the summit; sterile lemma 8–10 mm long, acuminate or with an awn as much as 1 mm long, pubescent like the glumes; first fertile lemma 9–10 mm long, acute, sometimes with an awn as much as 1 mm long, sparsely pubescent, or glabrous toward the base, the margins ciliate in the upper half; palea shorter than the lemma (about 1 mm), much narrower than the lemma, flat or only slightly concave, pubescent between the keels, especially toward the summit, the keels hispid, the tip truncate, hispid, the nerves usually excurrent.

TYPE: occasional along escarpment overlooking Cano Grande, below Cumbre Camp, alt. 1650 m, Cerro de la Neblina, Río Yatua, Terr. Amazonas, Venezuela, January 10, 1954, *Bassett Maguire, John J. Wurdack, & George S. Bunting 37208;* U.S. National Herbarium Nos. 2,182,104, 2,182,105. Other specimens from Cerro de la Neblina: frequent in west escarpment savanna, 4–8 km. southwest of Cumbre Camp, alt. 1850–1900 m, *Bassett Maguire, John J. Wurdack, & George S. Bunting*

Explanation of figures 1, 2

FIG. 1. *Myriocladus neblinaensis* Swallen. *a,* branch, ½; *b,* spikelet, × 5; *c, d,* base and tip of blade, × 5. FIG. 2. *Myriocladus simplex* Swallen. *a,* plant, × ½; *b,* panicle, × ½; *c,* spikelet, × 5. (Drawings by LaVerne Helen Richardson.)


b
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d
b
a
c
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1
2

37317; occasional at edge of west escarpment savanna, 2 km north of Cumbre Camp, alt. 1800 m, *Bassett Maguire, John J. Wurdack, & George S. Bunting 37240;* frequent in savanna 5 km west of Cumbre Camp, alt. 1900 m, *Bassett Maguire, John J. Wurdack, & George S. Bunting 37135.*

6. Myriocladus simplex Swallen, sp. nov. Figure 2.

Culmi erecti, caespitosi, 45 cm to 3 m alti, simplices vel summo ramis brevis, internodiis elongatis 1-3; vaginae hispidulae vel subglabrae, ligula exteriore inconspicua minute ciliata, in ore fimbriatae; laminae 5-7 cm longae, 5-10 mm latae, superiores breviores, adscendentes, basi quam vagina multo angustiores, ad basin sparse pubescentes, marginibus scabrae vel glabrae; ligula 1 mm longa, arcuata, pubescens; panicula 10-20 cm longa, ramis 3-6 adscendentibus, infimo usque ad 13 cm longo, axe et ramis glabra; spiculae variabiles, floris fertilibus 1 vel 2; gluma prima 2.8-4 mm longa, angusta, minute ciliata; gluma secunda 4.5-6 mm longa, subobtusa, ad summum minute ciliata; lemma sterile 5-6 mm longum, glumam secundam simulans; lemma fertile primum 5-6.3 mm longum, acutum summo minute ciliatum; palea quam lemmate 0.8 mm longior, truncata, summo hispidula, inter carinam ad summum minute pubescens.

Culms slender, tufted, erect, 45 cm to 3 m high, with 1-3, or possibly more, elongate internodes, alternate with single nodes or groups of much shortened internodes, simple, or the taller culms with a group of short branches at the summit; exposed portion of sheaths about 5 mm long, hispidulous, becoming glabrous or nearly so, the rim inconspicuous, minutely ciliate, the throat rounded, more or less fimbriate; blades commonly 5-7 cm long, 5-10 mm wide, or the upper ones smaller, rounded at the base, this much narrower than the mouth of the sheath but scarcely petiolate, sparsely pubescent toward the base, the margins scabrous to nearly glabrous; ligule about 1 mm long, broadly arcuate, pubescent on the back; inflorescence 10-20 cm long, sometimes less, consisting of 3-6 ascending racemes, the lowest usually remote, as much as 13 cm long, but usually shorter, with a rather large pulvinus at the base, the main axis and branches glabrous; spikelets very variable, with one or two fertile florets and a rachilla-joint, when with two fertile florets the rachilla-joint between them 0.5 mm long, thick, glabrous; first glume 2.8-4 mm long, usually narrow, minutely ciliate; second glume 4.5-6 mm long, subobtuse, minutely ciliate toward the summit, the thickened midnerve sometimes excurrent; sterile lemma 5-6 mm long, similar to the second glume; lemma of first fertile floret 5-6.3 mm long, acute, minutely ciliate near the summit, the midnerve somewhat thickened at the tip; palea exceeding the lemma as much as 0.8 mm, truncate, the tip hispidulous, minutely pubescent between the keels toward the summit.

TYPE: frequent along stream bank, right branch of Caño Yutaje, alt. 1300 m, Serranía Yutaje, Río Manapiare, Terr. Amazonas, Venezuela, February 9, 1953, *Bassett Maguire & Celia K. Maguire 35134;* U.S. National Herbarium No. 2,116,105.

7. Myriocladus exsertus Swallen, sp. nov. Figure 3c.

Culmi usque ad 4 m alti, ramosi; rami solitarii vel bini, elongati, erecti, graciles; vaginae glabrae vel pubescentes, in ore fimbriatae; laminae 10-11.5 cm longae, 2 cm latae, vel superiores breviores, basi subtruncatae, marginibus ad basin hispidulo-ciliatae; panicula 17-33 cm longa ramis adscendentibus, inferioribus 7-13 cm longis; spiculae 2-3-florae, distantae, pedicellis ca. 4 mm longis; gluma prima lineari-lanceolata, 2.5-3.5 mm longa, marginibus minute ciliata, summo hispidula; gluma secunda 4 mm longa, quam gluma prima latior; lemma sterile 5 mm longum, acutum, summo crassum, marginibus minute ciliatae;

lemma fertile primum 5 mm longum, lemma sterile simulans; palea quam lemmate paulo longior, inter carinam pubescens, summo hispidula.

Culms as much as 4 m tall, branching and rebranching, with or without long internodes between the branches, these single or in pairs, erect or nearly so, elongate, relatively slender; crowded sheaths extending upward on each branch for as much as 15 cm, the exposed portion of each sheath 1-1.5 cm long; sheaths glabrous or appressed pubescent, with a short, minutely ciliate rim at the summit, fimbriate in the throat; blades 10-11.5 cm long, 2 cm wide, or the upper ones smaller, acute, broadly rounded or subtruncate at the base, the margins hispidulous-ciliate toward the base, scabrous upward; inflorescence 17-33 cm long, with relatively few long ascending branches, the lower ones 7-13 cm long, the axis, branches, and pedicels glabrous; spikelets 2- or 3-flowered, distant, the pedicels about 4 mm long; first glume linear-lanceolate, 2.5-3.5 mm long, the margins minutely ciliate nearly to the base, the tip rounded, hispidulous; second glume 4 mm long, similar to the first but broader; sterile lemma 5 mm long, actue, blunt, the midnerve thickened at the tip, the margins minutely ciliate; first fertile lemma 5 mm long, similar to the sterile lemma; palea slightly longer than the lemma, pubescent between the nerves, the tip hispidulous.

TYPE: occasional, Summit Camp to Southwest Escarpment, alt. 1850 m, Cerro Huachamacari, Río Cunucunuma, Terr. Amazonas, Venezuela, December 17, 1950, *Bassett Maguire, R. S. Cowan, & John J. Wurdack 30295;* U.S. National Herbarium No. 2,040,226.

8. Myriocladus cardonae Swallen, Fieldiana 28(1): 35. 1950. Figure 3d.

VENEZUELA: Cumbre del Cerro Acopán, (Chimantá-tepuí), Bolívar, *Felix Cardona 2307.*

9. Myriocladus longiramosus Swallen, sp. nov. Figure 3e.

Culmi 3-5 m alti, summo ramis 4 usque ad 2 m longis; ramorum vaginae inferiores (pars manifestus) 2.5 cm longae, superiores longiores, suprema elongata; laminae 11-16 cm longae, 2.5-5.0 cm latae, basi subtruncatae, glabrae, marginibus scabrae; paniculae 40-55 cm longae, multiramosae, ramis adscendentibus, inferioribus 9-14 cm longis, subremotis, ad summum brevioribus et densioribus; spiculae 3-florae, suprema reducta secreta, pedicellis 2-3 mm longis appressis; rachilla scabra, inter flosculos 0.4-0.5 mm longa; gluma prima angusta, 2-2.7 mm longa; gluma secunda latior 2.8-3.5 mm longa; lemma sterile 3 mm longum, obtusum, glabrum; lemma fertile primum 4.4 mm longum, obtusum, glabrum; palea obtusa, lemma superans, concava, glabra, vel apice pubescens.

Culms 3-5 m tall; branches four together, the longest nearly 2 m long with a group of shortened internodes in the middle; exposed portion of sheaths at the base of the branches about 2.5 cm long, the upper ones longer, or the uppermost elongate; blades 11-16 cm long, 2.5-5.0 cm wide near the rounded subtruncate base, much narrower than the mouth of the sheath, the margins scabrous, otherwise glabrous; inflorescence 40-55 cm long, with numerous rather stiffly ascending branches, the lower ones 9-14 cm long, somewhat distant, becoming shorter and more crowded upward; spikelets 3-flowered, the upper rudimentary, usually hidden between the fertile florets, the pedicels 2-3 mm long, appressed; rachilla-segment below first fertile floret thick, 0.4 mm long, sparsely scabrous, the segment below the second floret 0.5 mm long, slender, scabrous; first glume narrow, 2-2.7 mm long, the tip blunt; second glume 2.8-3.5 mm long, somewhat broader than the first; sterile lemma 3 mm long, obtuse, glabrous, the midnerve thickened at the tip, sometimes slightly excurrent; lemma of first fertile floret 4.4 mm long, obtuse, glabrous, the midnerve thickened at the tip; palea obtuse, 0.5 mm longer than the lemma, deeply concave, glabrous, or obscurely pubescent at the tip.

TYPE: occasional in thickets and on rocky elevations 1 km south of Cumbre Camp, alt. 1800 m, Cerro Guaiquinima, Río Paragua, Bolívar, Venezuela, December 29, 1951, *Bassett Maguire 32822;* U.S. National Herbarium No. 2,078,761.

10. **Myriocladus affinis** Swallen, sp. nov. Figure 3f.

Culmi 3–5 m alti, summo 2–6 ramosi, internodio primario 1–2 m longo; rami 90–100 cm longi; vaginarum pars manifestus 2–3 cm longus, glabrus vel sparse pubescens, subtruncatus, in ore fimbriatus; laminae 17–24 cm longae, 3.5–5 cm latae, basi 6–8 mm latae, vix petiolatae, glabrae, marginibus scabrae; inflorescentia 50–70 cm longa, densa, multiramosa, ramis anguste adscendentibus, 6–8 cm longis, ad summum brevioribus et densioribus; axis, rami, et pedicelli dense pubescentes; spiculae purpureae, lemmate fertile 1, pedicellis 2–3 mm longis, appressis; gluma prima 2–2.6 mm longa, angusta, subacuta, in carina hispidula, marginibus ciliata; gluma secunda 2.5–4 mm longa, subacuta vel subobtusa, apice hispidula vel arista breve hispidula, summo marginibus ciliata; lemma sterile 3.5–3.8 mm longum, subobtusum, mucronatum, apice hispidulum; lemma fertile lemma sterile simulans, 3.8–4.1 mm longum; palea 2.6 mm longa, quam lemmate multo angustior.

Culms 3–5 m high, the main internode 1–2 m long, bearing 2–(6) branches at the summit, with a group of much shortened internodes for a distance of about 30 cm below the branches; branches 90–100 cm long; exposed portion of sheath 2–3 cm long, glabrous or sparsely pubescent, the rim at the summit 0.2 mm long, minutely irregular, the throat rounded, fimbriate; ligule 0.5 mm long, truncate, thick, glabrous; blades 17–24 cm long, 3.5–5 cm wide or the upper ones smaller, abruptly rounded at the base, glabrous on both surfaces, the margins scabrous to nearly smooth, the junction with the blade 6–8 mm wide, scarcely petiolate; inflorescence 50–70 cm long, rather dense, with numerous slender, narrowly ascending branches, commonly 6–8 cm long, much shorter and more crowded toward the summit, the main axis, branches, and pedicels densely pubescent; spikelets dark purple with 1 fertile floret and a rudiment, the pedicels 2–3 mm long, appressed; first glume 2–2.6 mm long, narrow, subacute, rarely with a short hispidulous awn, the nerve hispidulous, the tip densely so, the margins usually ciliate; second glume 2.5–4 mm long, subacute, the tip hispidulous, or subobtuse with a short hispidulous awn, the margins ciliate at the summit; sterile lemma 3.5–3.8 mm long, subobtuse, the tip hispidulous, usually mucronate; lemma of fertile floret 3.8–4.1 mm long, similar to the sterile lemma; palea 2.6 mm long, much narrower than the lemma.

TYPE: occasional about thickets, borders of woodlands, and rocky elevations, Cumbre Camp, alt. 1800 m, Cerro Guaiquinima, Río Paragua, Bolívar, Venezuela, December 28, 1951, *Bassett Maguire 32792;* U.S. National Herbarium No. 2,078,760.

11. **Myriocladus paruensis** Swallen, sp. nov. Figure 3g.

Culmi usque ad 5 m alti, glabri, in parte inferiore efoliosi; rami foliosi 2 vel 3, 0.6–1.7 m longi; culmorum sterilium laminae 45 cm longae, 9 cm latae, marginibus scabrae vel hispido-ciliatae; panicula 60–80 cm longa, racemis numerosis gracilibus adscendentibus, inferioribus usque ad 18 cm longis in parte inferiore ramulis brevibus; spiculae 2–3-florae, suprema reducta, pedicellis 2–4 mm longis glabris vel pubescentibus; gluma prima angusta 2–3 mm longa, summo compressa, hispidula; gluma secunda 2.5–5 mm longa, summo hispidula; lemma sterile glumam secundam simulans; flosculorum primorum lemma 4.0–4.3 mm longum, subobtusum, summo et marginibus plus minusve hispidulum; palea obtusa quam lemmate 0.5 mm longior; rachilla pubescens.

Culms as much as 5 m tall, leafless for as much as 3 m, solid, glabrous; leafy branches 2 or 3 together, 0.6–1.7 m long; sheaths about 9 cm long, the exposed portion mostly 1.5–3 cm long; blades of the sterile culms 45 cm long, about 9 cm wide near the rounded clasping base, not cordate, one margin thickened, rounded, scabrous, the other flattened, hispidulous-ciliate; inflorescence 60–80 cm long, with numerous narrowly ascending to somewhat spreading, rather slender racemes, the lower ones as much as 18 cm long, bearing short rather distant branchlets in the lower half, the axis nearly glabrous, the branches and branchlets sparsely to densely pubescent especially toward the base; spikelets 2–3-flowered, the upper floret reduced or rudimentary, the pedicels 2–4 mm long, appressed, glabrous or usually pubescent; first glume narrow, 2–3 mm long, the tip flat or laterally compressed, hispidulous; second glume 2.5–5 mm long, including the laterally compressed hispidulous tip from very short to as much as 1 mm long; sterile lemma similar to the second glume, equaling it or somewhat longer; lemma of first fertile floret 4.0–4.3 mm long, subobtuse, the midnerve thickened and sometimes rounded at the tip, the tip and sometimes the margins more or less hispidulous; palea obtuse, exceeding the lemma 0.5 mm; rachilla pubescent, the joint 0.5 mm long, rather stout, the second more slender, 1.0 mm long.

TYPE: West Rim north of Camp Caño, elev. 2000 m, Serranía Parú, Río Parú, Caño Asisa, Río Ventuari, Terr. Amazonas, Venezuela, January 31, 1951, *R. S. Cowan & John J. Wurdack 31076;* U.S. National Herbarium Nos. 2,040,247 and 2,040,248.

12. Myriocladus grandifolius Swallen, sp. nov. Figure 3h.

Culmi usque ad 3 m alti; culmorum fertilium rami 2.4 m longi, basi 1.5 cm crassi; vaginae glabrae, in ore fimbriatae; ligula exteriore crassa, glabra, irregularis; ligula 1 mm longa, glabra, truncata; laminae 26 cm longae, 12 cm latae, subcordatae, epetiolatae, acutae, glabrae, marginibus obscure scabrae; panicula 68 cm longa, ca. 8 cm lata, racemis numerosis anguste adscendentibus vel patentibus, 4–6 cm longis vel ad summam brevioribus, axe dense pubescens; spicula floribus fertilibus 2; gluma prima angusta, pubescens, ad summam hispidula; gluma secunda latior, 5–6 mm longa, pubescens, abrupte acuta, arista 2 mm longa; lemma sterile 4.5 mm longum, glabrum, glumam secundam simulans; lemma fertile primum 5.5–5.7 mm longum, acutum, glabrum, summo hispidulum, marginibus minute ciliatum; palea quam lemmate angustior, 3 mm longa, inter carinam pubescens, summo hispidula nerviis minute excurrentibus.

Culms as much as 3 m high; flowering branch 2.4 m long, about 1.5 cm thick at the base (including the persistent sheaths); exposed portion of sheaths about 3 cm long, glabrous, fimbriate in the throat, the rim thick, irregular, glabrous; ligule 1 mm long, glabrous, truncate; prophyllum broad, conspicuous, extending 2 cm above the sheath; blades 26 cm long, about 12 cm wide toward the base, subcordate, the junction with the sheath 2 cm wide, not petiolate, glabrous, the tip acute, the margins glabrous or obscurely scabrous; inflorescence long-exserted, 68 cm long, about 8 cm wide, the very numerous, relatively stout branches spikelet-bearing to the base, narrowly ascending to spreading, mostly 4–6 cm long, shorter and denser toward the summit, solitary or usually arranged in groups of two or three, a densely pubescent pulvinus at the base, the axis and branches densely pubescent; spikelets immature, apparently with two fertile florets and a rudiment, the rachilla scabrous, the segment above the sterile lemma 0.5 mm long, the segment above the fertile floret 1 mm long; first glume narrow, tapering, pubescent on the back, hispidulous toward the tip; second glume broader, somewhat abruptly narrowed above, 5–6 mm long including the awnlike tip as much as 2 mm long, pubescent on the back, hispidulous toward the tip; sterile lemma 4.5

mm long, similar to the second glume but glabrous on the back, the awnlike tip as much as 1 mm long; lemma of first fertile floret 5.5–5.7 mm long, acute, rarely with an awnlike tip 0.5 mm long, glabrous on the back, more or less hispidulous at the tip, the margins minutely ciliate; palea much narrower than the lemma, 3 mm long, sparsely pubescent between the keels, the nerves minutely excurrent, the tip hispidulous between the nerves.

TYPE: infrequent, thickets bordering stream, Lower Caño Negro, Cerro Sipapo (Paráque), Terr. Amazonas, Venezuela, January 1, 1949. *Bassett Maguire & Louis Politi 28101;* U.S. National Herbarium Nos. 2,040,184, 2,040,185.

13. **Myriocladus paraquensis** Swallen, sp. nov. Figure 3i,j.

Culmi usque ad 5 m alti; culmi sterile: vaginae 9.5 cm longae, scaberulae, in ore fimbriatae, ligula exteriore 1 mm longa, crassa, erosa; laminae 42 cm longae, 11.5 cm latae, acuminatae, subcordatae, marginibus scabrae; culmorum fertilium rami 100–135 cm longi; laminae 9–12 cm longae, ca. 6 cm latae, suprema brevior; panicula 42–48 cm longa racemis numerosis rigide adscendentibus, inferioribus 3.5–4.5 cm longis, axe et ramis dense pubescens; spiculae brevipedicellatae, appressae, floribus fertilibus 1 vel 2; glumae acutae vel acuminatae, pilosae, prima 2–2.8 mm longae, secunda latior 3.2–4.5 mm longa; lemma sterile 3–3.5 mm longum, acutum vel subobtusum, interdum mucronatum; lemma fertile primum 5–5.5 mm longum, acutum vel mucronatum, glabrum, marginibus ciliatum; palea quam lemmate longior vel brevior, concava, inter carinam sparse pubescens, summo angusta, truncata, hispidula, nerviis minute excurrentibus; rachilla crassa, pubescens.

Culms as much as 5 m high; sterile culms 1.4 cm thick, hollow; sheaths about 9.5 cm long, scaberulous, the rim about 1mm long, thick, erose, fimbriate in the throat with long curly hairs; blades of sterile culms 42 cm long, 11.5 cm wide, the tip acuminate, broadly rounded, subcordate at the base, the margins scabrous; branches of flowering culms 100–135 cm long, the blades 9–12 cm long, about 6 cm wide, or the uppermost smaller; inflorescence 42–48 cm long, with numerous stiffly ascending racemes, the lower ones rather distant or approximate, 3.5–4.5 cm long, becoming shorter and crowded toward the summit, the axis and branches densely pubescent; spikelets with 1 or 2 fertile florets, short-pedicellate, appressed; glumes acute or acuminate, pilose, the first 2–2.8 mm long, rarely less, the second somewhat broader 3.2–4.5 mm long; sterile lemma 3–3.5 mm long, acute or subobtuse, sometimes mucronate, pilose only at the summit; lemma of first fertile floret 5–5.5 mm long, acute, sometimes mucronate, glabrous, usually finely ciliate on the margins; palea a little shorter to a little longer than the lemma, concave, sparsely pubescent between the keels, the tip narrow, truncate, hispidulous, the nerves minutely excurrent; rachilla rather thick, pubescent, the segment above the sterile lemma 0.5 mm long, the one above the first fertile lemma 2 mm long.

TYPE: common, cliffs above Savanna Camp, Cerro Sipapo (Paráque), Terr. Amazonas, Venezuela, January 17, 1949, *Bassett Maguire & Louis Politi 28395;* U. S. National Herbarium Nos. 2,040,181, 2,040,182, and 2,040,183.

15. **Myriocladus paludicolus** Swallen, sp. nov. Figure 4b.

Culmi fertiles 0.3–1 m alti; culmi steriles usque ad 8 m alti; vaginae 4–5 cm longae, condensatae, auriculis fimbriatis, ligula exteriore breve, crassa, glabra vel minute ciliata; culmorum sterilium laminae 30 cm longae, 10.5 cm latae, subcardatae; culmorum fertilium laminae 9–16 cm longae, 4–6 cm latae, vel

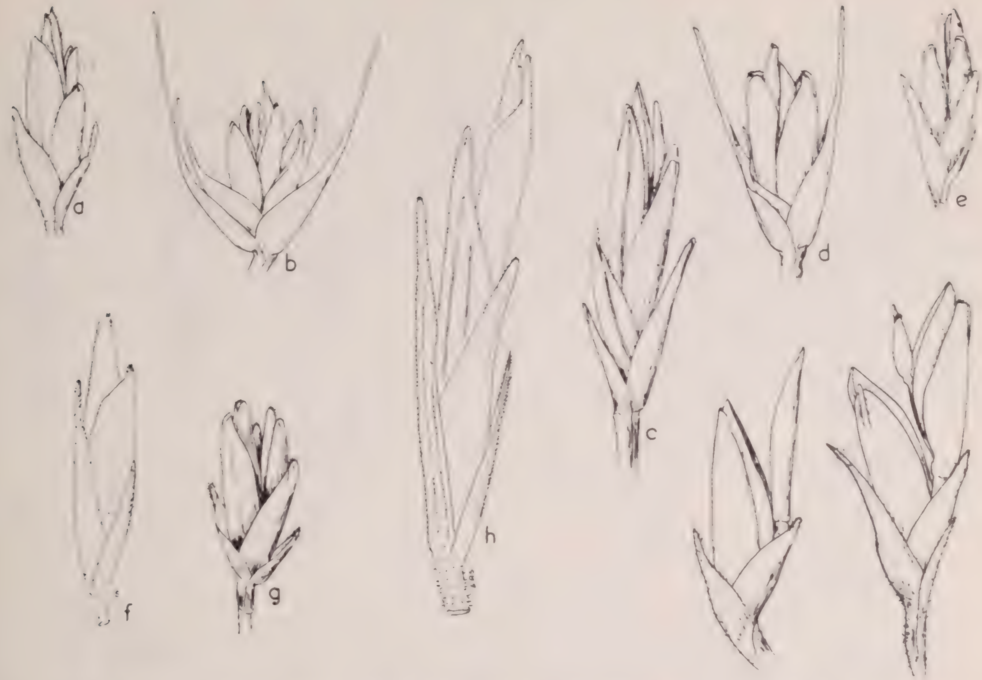

FIG. 3. Spikelets of *Myriocladus* Swallen; × 5 except *f* and *h* × 8. *a*, *M. steyermarkii;* *b*, *M. maguirei;* *c*, *M. exsertus;* *d*, *M. cardonae;* *e*, *M. longiramosus;* *f*, *M. affinis;* *g*, *M. paruensis;* *h*, *M. grandifolius;* *i*, *j*, *M. paraquensis.* (Drawings by LaVerne Helen Richardson except *f* and *h*.)

suprema brevior, abrupte acuminatae, glabrae, marginibus crassis albidis; paniculae pyramidatae, usque ad 40 cm longae, basi 12 cm latae, ramis adscendentibus vel patentibus ramulis divergentibus in parte inferioribus, axe dense pubescentes vel pilosae; spiculae 3–4 florae, suprema reducta; rachilla pubescens vel pilosa; gluma prima angusta, acuminata, 4–4.5 mm longa; gluma secunda latior, acuminata, 6–8 mm longa; lemma sterile 5 mm longum, abrupte acuminatum; lemma fertile primum 5.5 mm longum, obtusum vel subobtusum, glabrum vel ad marginem sparse pilosum, summo carina crassa, interdum mucronatum; palea lemma aequans vel superans.

"Fertile canes 0.3–1 m (high); sterile canes to 8 m." Sheaths 4–5 cm long, crowded, glabrous, with a short, thick, glabrous or very minutely ciliate rim at the summit, somewhat auriculate, the auricles bearing crowded curly bristles; blades of the sterile culms as much as 30 cm long, 10.5 cm wide at the base, truncate or subcordate; blades of the flowering culms 9–16 cm long, 4–6 cm wide, or the uppermost of the branches smaller, rather abruptly acuminate, glabrous, with rather prominent thick whitish margins, the cross-veins plainly visible on the lower surface; inflorescence pyramidal, as much as 40 cm long, 12 cm wide at the base, the branches stiffly ascending or spreading, bearing short divergent branchlets in the lower half, the axis, branches, and pedicels rather densely pubescent or pilose; spikelets 3–4-flowered, the upper floret reduced or rudimentary, the rachilla-joints pubescent or pilose at least toward the summit; first glume narrow, acuminate, 4–4.5 mm long; second glume broader, acuminate, 6–8 mm long; sterile lemma 5 mm long, abruptly acuminate; lowest fertile lemma 5.5

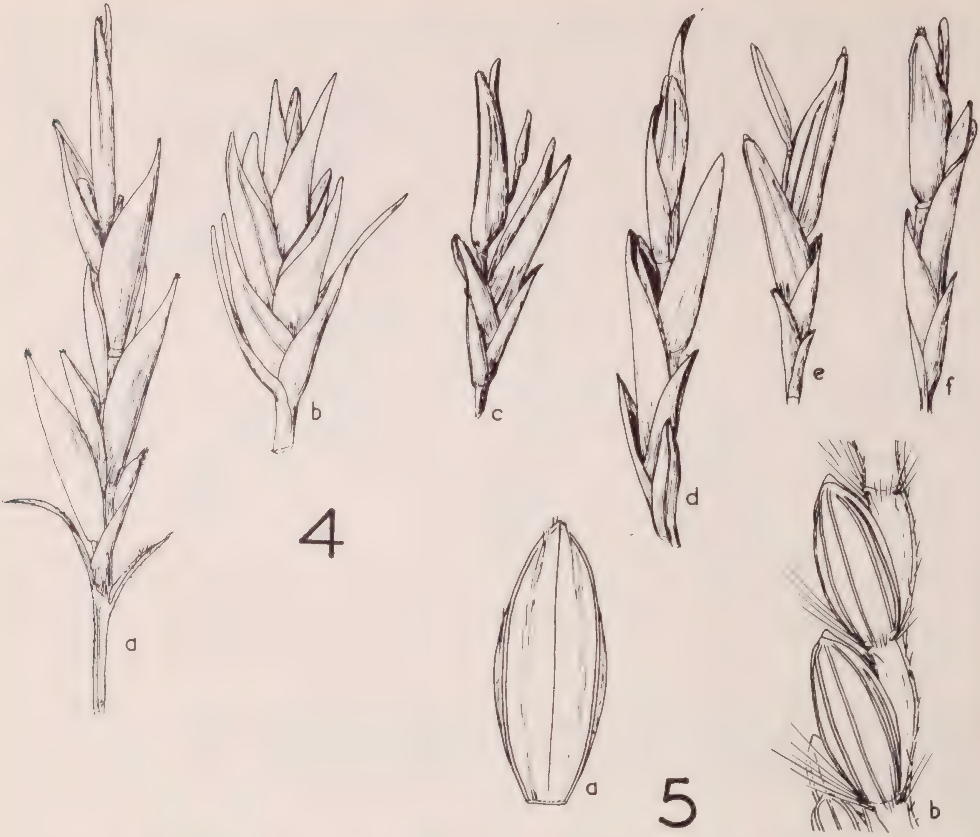

FIG. 4. Spikelets of *Myriocladus* Swallen; × 5. *a, M. variabilis; b, M. paludicolus; c, M. confertus; d, M. distantiflorus; e, M. purpureus; f, M. wurdackii.* FIG. 5. *a, Axonopus maguirei* Black, spikelet, × 15; *b, Axonopus suffultiformis* Black, portion of rachis with spikelets, × 10. (Drawings by LaVerne Helen Richardson.)

mm long, obtuse or subobtuse, glabrous or sparsely pilose near the margins, the midnerve thickened at the summit, sometimes excurrent in a short mucro; palea as long as or slightly longer than the lemma, glabrous, or sparsely pilose between the keels.

TYPE: locally frequent on open headland, 7 km north of Cumbre Camp, alt. 1900 m, Cerro de Neblina, Río Yatua, Terr. Amazonas, Venezuela, January 10, 1954, *Bassett Maguire, John J. Wurdack, & George S. Bunting 37200*; U. S. National Herbarium Nos. 2,182,101 and 2,182,102.

17. **Myriocladus distantiflorus** Swallen, sp. nov. Figure 4d.

Culmi usque ad 5 m alti; rami floriferi ca. 80 cm longi; vaginae ligula exteriore 0.4 mm longa, minute ciliata vel glabra, in ore fimbriatae, subtruncatae; ligula brevis in costa hispida; panicula ca. 65 cm longa, 7 cm lata, densa, ramis numerosis adscendentibus usque ad 10 cm longis, inferioribus ramulis appressis vel divergentibus; spiculae 1–4-florae; rachilla gracilis, glabra; glumae 2–3 mm longae, angustae, summo hispidulae; gluma secunda et lemma sterile subaequalia, 3–4 mm longa, glumam primam simulans vel lemma sterile obtusum, mucronatum; lemma fertile 5–5.5 mm longum, obtusum vel subobtusum, rare mucronatum, glabrum; palea quam lemmate longior vel brevior, summo minute hispidula.

Culms as much as 5 m high; flowering branch about 80 cm long; blades unknown (all fallen); exposed portion of sheath 1.5–2.0 cm long, the uppermost 4 cm, the rim 0.4 mm long, firm, the margin irregular, minutely ciliate or glabrous, the throat subtruncate, fimbriate; ligule short and firm, hispid on the back; panicle 65 cm long, about 7 cm wide at the middle, dense, with numerous stiffly ascending branches as much as 10 cm long, becoming shorter and denser toward the summit, at least the lower ones with relatively short appressed or somewhat spreading branchlets, the main axis and branches pubescent; spikelets with 1–4 distant fertile florets (commonly 3), the rachilla slender, glabrous, the segment above the sterile lemma about 0.5 mm long; first glume 2–3 mm long, narrow, the tip hispidulous; second glume and sterile lemma subequal, 3–4 mm long, rarely longer or shorter, similar to the first glume, or the sterile lemma occasionally obtuse, mucronate; fertile lemma 5–5.5 mm long, obtuse or subobtuse, glabrous, rarely mucronate; palea as long as the lemma, sometimes shorter, or longer in the upper florets, the tip minutely hispidulous.

TYPE: Cumbre of Cerro Apacará, Río Caroni, alt. 2300 m, Chimantá Massif, Bolívar, Venezuela, November 11, 1946, *Cardona 1972*.

Neurolepis angusta Swallen, sp. nov.

Culmi erecti 2.5 m alti; foliarum inferiorum vaginae confertae usque ad 35 cm longae, auriculatae, fimbriatae, marginibus tenuibus; ligula ca. 1 cm longa; laminae 165 cm longae, 6.5 cm latae, acuminatae, marginibus plus minusve scabrae, petiolo crasso, duro, sulcato, 50 cm longo; foliarum culmorum vaginae elongatae, solutae, laminae 80 cm longae, 6 cm latae, epetiolatae; panicula 75 cm longa, 2.5–3 cm latae, densae, ramis rigide adscendentibus inferioribus 4 cm longis, ad summum paniculae brevioribus et densioribus, ramulis brevibus appressis vel plus minusve divergentibus; spiculae 8–9 mm longae, brevipedicellatae; glumae et lemmata sterilia obtusa, apiculata; gluma prima 1–1.5 mm longa; gluma secunda 2–2.5 mm longa; lemma sterile primum 3–4.5 mm longum; lemma fertile arista 1.5–2 mm longa, valida, acri; palea lemma subaequans, obtusa.

Perennial; culms erect, hollow, thin-walled, more than 2.5 m high; basal leaves: sheaths crowded, as much as 35 cm long, auriculate, the auricles long-fimbriate, the very thick back rounded, the margins thin; ligule about 1 cm long, the fibrous membrane behind it as much as 3 cm long; blades 165 cm long (including the petiole), 6.5 cm wide, more or less scabrous on the margins, acuminate, long-attenuate to a thick, hard, sulcate, petiole-like base about 50 cm long; culm leaves: sheaths loose, elongate, the back scarcely thickened, the fimbriate auricles less conspicuous; blades about 80 cm long, 6 cm wide, apparently persistent, gradually narrowed toward the base but not petiolate; panicle 75 cm long, mostly 2.5–3 cm wide, dense, the branches stiffly ascending, the lower ones about 4 cm long, somewhat distant, becoming shorter and densely crowded toward the summit, mostly with short appressed or somewhat spreading branchlets; spikelets 8–9 mm long, short pedicellate; glumes and sterile lemmas usually obtuse, apiculate, less frequently acute or obtuse only; first glume 1–1.5 mm long; second glume 2–2.5 mm long; first sterile lemma 3–4.5 mm long; second sterile lemma 4.5–5 mm long; fertile lemma tapering into a stout, smooth, sharp-pointed awn 1.5–2 mm long; palea about as long as the lemma, blunt, not keeled, the nerves not evident.

TYPE: abundant in open places in low brush on cumbre slopes, saddle between North Peak and central plateau, alt. 2300–2600 m, Ilu-tepuí, Gran Sabana, Bolívar, Venezuela, March 15, 1952, *Bassett Maguire 33412;* U.S. National Herbarium Nos. 2,078,769, 2,078,770.

Thrasya guianensis Swallen, sp. nov.

Perennis; culmi erecti, ramosi, ca. 90 cm alti; vaginae internodiis paulum longiores vel breviores, ad summum pilosae marginibus ciliatae; ligula 1–2 mm longa, fusca; laminae 8–18 cm longae, 4–6 mm latae, subattenuatae, dense pilosae; inflorescentiae terminales et axillares; racemi 1 vel 2, 4–11 cm longi; rachis 1 mm lata, marginibus scabra, pilis paucis rigidis longis; spiculae 1.6–1.8 mm longae, obtusae, pedicellis brevibus dense pubescentibus; gluma prima 0.3 mm longa, obtusa, enervis; gluma secunda obtusa fructu 1/3 brevior vel fructum subaequans; lemma sterile fructum aequans, glabrum vel sparse pilosum; fructus obtusus, albus, papillosus.

Perennial; culms erect, branching from most of the nodes, about 90 cm high; sheaths a little longer or shorter than the internodes, pilose toward the summit, the margins ciliate; ligule 1–2 mm long, brown; blades 8–18 cm long, 4–6 mm wide, subattenuate, somewhat narrowed toward the base, densely pilose; inflorescences terminal and axillary, with usually solitary or sometimes 2 racemes 4–11 cm long; rachis 1 mm wide, the margins scabrous and with scattered long stiff hairs; spikelets 1.6–1.8 mm long, obtuse, the short pedicels densely pubescent; first glume 0.3 mm long, obtuse, nerveless; second glume obtuse ⅔ as long to nearly as long as the fruit; sterile lemma equaling the fruit, glabrous or occasionally sparsely pilose; fruit obtuse, white, strongly papillose.

TYPE: dominant caespitose grass of burnt savanna, Sagaraimadai, alt. 550 m, Upper Mazaruni River, British Guiana, November 16, 1951, *Bassett Maguire & D. B. Fanshawe 32621A*; U. S. National Herbarium No. 2,078,799.

Axonopus rivularis Black, sp. nov.

Perennis, foliis laxis; culmi 75–90 cm longi, 1–2 mm crassi, teretes vel vix compressi; nodi 1–2, pilosi; vaginae 10–35 cm longae, superiores longiores, 1–3 mm latae, dorso rotundatae, cataphyllis 1–3 mm longis, ad basin nonnumquam a culmis solutae, internodiis breviores, glabrae, summo ciliatae; ligula 0.3–0.4 mm longa, ciliata; laminae 10–30 cm longae, 0.5–1.0 cm latae, planae, lineari-lanceolatae nervo mediano prominulo, longe-acuminatae, ad basin dense pilosae, subtus sparse pilosae pilis longis, supra glabrescentes; inflorescentiae terminales, pedunculis 2–4, ca. 30–40 cm longis; paniculae 15–25 cm longae; racemi 2–3, divergentes, ca. 10–20 cm longi, axilla dense molliter pilosa, interdum pilis longioribus adspersis; rhachis 0.3–0.4 mm lata, viridescens, glabra vel scabrida, flexuosa, in 25 mm 10–11 spiculis praedita; spiculae 3.2–3.3 mm longae, 0.7–0.8 mm latae, lineari-lanceolatae, obtusae; gluma et lemma sterile aequalia, 5–7-nervia, nervis prominulis ad apicem productis, inter nervos adpresse et sparse pilosa; pedicellus brevissimus; flosculus 2.0–2.1 mm longus, albidus, obtusus, ad apicem dense breviter molliterque pilosus.

Erect or spreading perennial, leafy throughout, the foliage lax; culms 75–90 cm tall, 1–2 mm thick, terete or slightly compressed, often reddish or purplish; nodes 1–2, 1–3 mm long, appressed-pilose, often glabrescent; sheaths 10–35 cm long, the upper ones longest, 1–3 mm wide, not keeled, sometimes remote from the culm, glabrous or ciliate toward the summit, shorter than the internodes, some reduced to cataphylls 1–3 cm long; ligule 0.3–0.4 mm long, ciliate, the crown often longer than the base; collar hairy on either side, the wedge-shaped area distinct; blades 10–30 cm long, 5–10 mm wide, broadest at the middle, flat, acuminate, the midnerve prominent, the margins scabrous, long-ciliate at the base, densely hairy on the under surface, glabrescent above with a few long hairs just above the ligule, the base equal to the width of the sheath or slightly broader; inflorescence terminal; peduncles 2–4, 15–25 cm long, usually red-tinged; panicles 15–25 cm

long; racemes 2–3, widely divergent, 10–20 cm long, the axils densely short-hairy with a few to several long hairs often intermixed; rachis 9.3–0.4 mm wide, greenish, glabrous or scabrous, flexuous, sharply triquetrous; spikelets 10–11 per 25 mm, 3.2–3.3 mm long, 0.7–0.8 mm wide, linear-lanceolate, obtuse, the pedicels 0–0.2 mm long; glume and sterile lemma equal, 5–7-nerved, the nerves meeting at the apex, sparsely pilose between the nerves; fertile floret 2–2.1 mm long, pale yellow or white, obtuse, with a tuft of short crowded hairs at the apex.

TYPE: frequent, Danto Paso, wet banks along rocks, Danta Falls, Río Cuao, Río Orinoco, Terr Amazonas, Venezuela, alt. 150 m, November 20, 1948, *Bassett Maguire & Louis Politi 27349;* U. S. National Herbarium No. 2,040,168.

Axonopus yutajensis Black, sp. nov.

Perennis; culmi erecti 75–100 cm alti, glabri, viridipallidescentes, caudice ad 1.5 cm crasso; nodi 2–3; vaginae 7–35 cm longae, 1–1.5 cm latae, carinatae, ad basin subaequales, persistentes, rigidae, fortiter conduplicatae, flabelliformes; ligula 0.3–0.4 mm longa, ciliata pilis albidis ca. 0.2 mm longis; laminae 0.5–30 cm longae, 4–7 mm latae, obtusae, superiores reductae, conduplicatae, apice fissae; inflorescentiae terminales, pedunculis 1–2, 30–45 cm longis, 1–2 mm crassis; paniculae 15–22 mm longae; racemi 5–8, adscendentes vel patentes, 10–20 cm longi; rhachis 0.5 mm lata, scabrida, ad basin pedicellorum pilis longis munita, in 25 mm 10–11 spiculis praedita; spiculae 2.5–2.8 mm longae, 1–1.2 mm latae, ovatae, obtusae; gluma lemma sterileque aequalia, 5–7-nervia, nervis prominulis, glabra; flosculus spiculae longitudinem subaequans, pallidus, apice minutissime puberulo; antherae atropurpureae, 1.2–1.3 mm longae, 0.3–0.5 mm latae.

Erect robust perennial, with rigid, light green, mostly glabrous foliage; culms 75–100 cm tall, sometimes branching, the caudex attaining 1.5 cm in thickness; nodes 1–2, glabrous; sheaths 7–35 cm long, 1–1.5 cm broad, conduplicate, strongly keeled, 7 crowded at the base, flabelliform, subequal, 8–10 cm long, pale with some pink and yellow (habit of *Axonopus pruinosus* Henr.), with cataphylls intermixed at the base; ligule 0.3–0.4 mm long, ciliate, the hairs 0.2 mm long, divided from the undifferentiated base by a dark red line, with a very slight constriction at the junction of the sheath and blade, the blade very slightly broader, the collar an inconspicuous transverse line; blades 0.5–30 cm long, 4–7 mm wide (folded), the uppermost shortest, conduplicate, deciduous, obtuse or rounded, often retuse, the halves often unequal in length; peduncles 1–2, 30–45 cm long, 1–2 mm in diameter; panicles 15–22 cm long; racemes 5–8, ascending or spreading, 10–20 cm long, with a few long hairs in the axils; rachis 0.5 mm wide, green, scabrous, the pedicels subtended by numerous hairs 1–3 mm long; spikelets 10–11 per 25 mm, 2.5–2.8 mm long, 1–1.2 mm wide, ovate, obtuse, the pedicels 0.3–0.5 mm long; glume and sterile lemma equal, glabrous, with 5–7 prominent nerves; fertile floret equaling the spikelet in length, or minutely shorter, pale yellow or brown, the lemma subacute, with a minute tuft of hairs at the apex; anthers deep atropurpureous, 1.2–1.3 mm long, 0.3–0.5 mm wide.

TYPE: clumped, about 1 m high; common in thickets along fork of Caño Yutaje, alt. 1300–1400 m, Cerro Yutaje, Serrania Yutaje, Río Manapiare, Terr. Amazonas, Venezuela, February 15, 1953, *Bassett Maguire & Celia K. Maguire 35265;* U. S. National Herbarium No. 2,116,108.

Axonopus arundinaceus Black, sp. nov.

Perennis; culmi usque ad 3 m alti, erecti, rigidi, compressi, ad 7 mm lati, nodis paulum pilosis, internodiis 7–10 brevissimis com internodiis elongatis alternantibus follis cinereo-viridibus; vaginae 15–20 cm longae, 1–2 cm latae, inferiores subaequales, fortiter conduplicatae, carinatae; ligula 0.1–0.2 mm longa, integra (nostra), collo saepissime pilis longis adspersis; laminae 40–60 cm longae, 8–25 mm latae (duplicatae), lineares, rigidissimae, obtusae, conduplicatae vel ad apicem planae, scabriusculae, basi ciliatae, deciduae, apice lateribus inaequalibus, uno alterove curvato vel contorto; inflorescentiae terminales, pedunculis 2, 50–100 cm longis, triquetribus, 1–1.5 mm crassis, infra panicula scabriusculis; panicula ca. 30 cm longa, axi 6 cm longo; racemi 6–12, adscendentes, 8–21 cm longi, axillis brevissime pilosis; rhachis 0.6–0.7 mm lata, viridis, scabrida, sparse pilosa, infra pedicellos paucis pilis munita, in 25 mm 8 spiculis praedita, ad basin spiculis remotis; spiculae 3.0–3.3 mm longae, 1.3 mm latae, obtusae, ovatae; gluma lemma sterile aequans, 7 nervis prominulis, inter nervos paucis pilis adpressis praedita; flosculus spiculae longitudinem aequans, pallido-albidus vel pallido-brunneus apice minutissime pilosus obtusus.

Perennial with stiff, scabrous, drab green foliage; culm up to 3 m tall (label), up to 7 mm thick at the base, compressed, the leaves arranged in fan-shaped clusters from groups of densely crowded nodes, the groups 10–15 cm apart; nodes 4–5, sparsely hairy or glabrescent; sheaths 15–20 cm long, 1–2 cm wide, conduplicate, strongly keeled, fused for more than one third to one half the width, often long hairy near the summit; ligule a thin white membrane, 0.1–0.2 mm long; collar a distinct transverse line, the interior of the collar glabrous; blades 40–60 cm by 8–25 mm (opened), conduplicate, keeled or opening above, ciliate along the lower margins, less commonly also above, sometimes scabrous, obtuse, the halves of the apex often unequal, the longer one recurved over the other to form a beak-like tip, deciduous; inflorescence terminal, scarcely to long-exserted from the sheath, the peduncles 2, about 50 cm long, triangular, 1–1.5 mm thick, minutely scabrous at the base of the panicle; panicle 30 cm long, the axis 6 cm long; racemes 6–12, ascending, the lower ones sometimes fasciculate, 8–21 cm long, the axils minutely hairy; rachis 0.6–0.7 mm wide, scabrous and sparsely short pilose along the margin, green, a few pedicels subtended by a few hairs, the lower half of the rachis often left naked by early deciduousness of the spikelets; spikelets 8 per 25 mm, the lower ones much more remote, 3.0–3.3 mm long, 1.3 mm wide, reddish, or purplish, obtuse, ovate; glume and sterile lemma equal, 7-nerved, or the sterile lemma sometimes 5-nerved, the nerves strong, with lines of short sparse hairs between the nerves; fertile floret equaling the spikelet in length, pale yellow or pale brown (somewhat lustrous in a few cases but never like the *Suffulti*), the lemma obtuse, with a few hairs at the tip.

TYPE: frequent, dominant herb of mountainside, stigmas reddish, to 3 m tall, montane savanna in caño, alt. 800 m, Cerro Moriche, Río Ventuari, Amazonas, Venezuela, January 14, 1951, *Bassett Maguire, R. S. Cowan, & John J. Wurdack 30883;* U. S. National Herbarium No. 2,040,245.

Axonopus maguirei Black, sp. nov. Figure 5a.

Perennis, foliis densissime pilosis; culmi 1.6 m alti, erecti, internodiis subaequalibus, ad basin 5 mm crassi, compressi; nodi 8 densissime pilosi; vaginae 3–30 cm longae, 0.7–1.0 cm latae, basales brevissimae, supremae longiores, pilosissimae, carinatae, summo linea densissime pilosa praeditae; ligula 0.4–0.5 mm longa, longe-ciliata; laminae 7–25 cm longae, 1.5–2.0 cm latae (planae), lanceolatae, acuminatae, basi supra paucis pilis 1–2 mm longis; inflorescentiae terminales, pedunculo 1 ca. 45 cm longo, 1 mm crasso, viride; panicula 23 cm longa axi 10 cm longo; racemi 12, laxe adscendentes, inferiores fascicu-

lati, 8–15 cm longi; rhachis 0.6–0.8 mm lata, viridis, scaberrima, ad basin pilis sparsis 1–2 mm longis adspersis, in 25 mm 10–11 spiculis praedita; spiculae 2.2–2.4 mm longae, 0.8 mm latae, ovatae vel oblongae, purpureae; gluma et lemma sterile aequalia, 5–7-nervia, pilorum brevium adpressorum albidorum lineis conspicuis inter nervos munita, pilis basi densioribus; pedicellus 0.3 mm longus; flosculus 2.1–2.2 mm longus, spicula paulum brevior, pallidus, sub brunneo-nitens, lemmate fertile apice piloso pilis brevibus.

Erect perennial with densely hairy foliage; culm 1.6 m high, 5 mm thick at the base, compressed, yellowish; nodes 8, densely long-appressed-hairy; sheaths 3–30 cm long, 0.7–1.0 cm wide, the uppermost longest, densely hairy, keeled, the collar a dense transverse line of hairs, without a wedge-shaped area; ligule 0.4–0.5 mm long, the ciliate portion longer than the base; blades 7–25 cm long, 15–20 mm wide (open), lax, lanceolate, acuminate, densely hairy on both surfaces with few to several long hairs 1–2 mm long on the upper surface at the base, glabrescent toward the apex, the margins very scabrous; inflorescence terminal; peduncles single, about 1 mm thick, 45 cm long, greenish; panicle 23 cm long, the axis 10 cm long; racemes 12, laxly ascending, the lower ones fasciculate, 8–15 cm long; rachis 0.6–0.8 mm wide, green, markedly scabrous, sometimes with a few hairs 1–2 mm long toward the base; spikelets 10–11 per 25 mm, exceeding the rachis by one quarter of their width, 2.2–2.4 mm long, 0.8 mm wide, dark purple, ovate to oblong, obtuse, the pedicels 0.3 mm long; glume and sterile lemma equal, 5–7-nerved, with characteristic, though not copious, lines of white appressed hairs between the nerves, hairiest at base; fertile floret 2.1–2.2 mm long, minutely shorter than the spikelet, pale brown, obtuse, with a tuft of hairs at the apex.

TYPE: coarse bunch grass; occasional in valley woodland south of airstrip, alt. 700 m, Serra Tepequem, Terr. do Rio Branco, Brazil, November 29, 1954, *Bassett Maguire & Celia Maguire 40108;* U. S. National Herbarium No. 2,182,169.

Axonopus suffultiformis Black, sp. nov. Figure 5b.

Perennis; culmi ca. 1 m alti, crassi; nodi 1–2, glabri; vaginae 8–9 cm longae, 5–7 mm latae, fortiter carinatae, conduplicatae, basi confertae, flabelliformes (*Axonopum pruinosum* simulans); ligula 0.2 mm longa; laminae 20–40 cm longae, 5–6 mm latae (duplicatae), conduplicatae, obtusae, apice nonnumquam fissae, glabrae, deciduae, pallido ovilaceae; inflorescentiae terminales 25–30 cm longae; paniculae 10–15 cm longae, axi 1–3.5 cm longo; racemi 9, subdigitati, ca. 5–13 cm longi, axillis pilis perbrevibus mollibus interdum pilis longis praeditis; rachis 0.5 mm longa, viridis, dorso glabra, marginibus scabrida, pedicellorum basi pilis 0.5–0.8 mm longis praedita, in 25 mm spiculis 24–26 praedita; spiculae 2 mm longae, 0.7–0.8 mm latae, pallidae; gluma lemma sterile aequans, 5-nervis, nervis prominulis, glabra, vel basi sparse pilosa; flosculus spiculae longitudinem aequans, pallido-fulvus, glaber vel ad apicem paucissimis pilis perbrevibus praeditus.

Erect perennial with pale green, rigid, mostly glabrous foliage; culm 1 m tall, 2.5–3 cm thick at the base including the leaves, little compressed; nodes 1–2, glabrous; sheaths 8–9 cm long, 5–7 mm wide, conduplicate, strongly keeled, 10–20 at the base, flabellate (like Axonopus pruinosus Henr.); ligule a membranous line 0.2 mm long; collar a thin transverse line; blades 20–40 cm long, 5–6 mm wide (folded), conduplicate, obtuse, often splitting at the tip, glabrous, pale olivaceous, deciduous; inflorescence terminal; peduncles 2, 25–30 cm long; panicle 10–15 cm long, the axis 1–3.5 cm long; racemes 9, subdigitate, ascend-

ing, 5–13 cm long, the axils with short and long hairs intermixed; rachis 0.5 mm wide, green, the margins scabrous; spikelets arranged neatly in close rows, 24–26 per 25 mm, sometimes more remote near the base, 2.0 mm long, 0.7–0.8 mm wide, ovate, obtuse; glume equaling the sterile lemma, sometimes minutely shorter than the floret, strongly 5-nerved, glabrous or with a few hairs at the base, pale green; pedicels 0–0.4 mm long, subtended by several hairs 0.5–0.8 mm long; fertile floret equaling the spikelet in length, acute, pale yellow, glabrous or with 1–2 minute hairs at the apex.

TYPE: locally frequent, leaves conduplicate, northwest slope, Cerro Yapacana, Río Orinoco, Amazonas, Venezuela, January 1, 1951, *Bassett Maguire, R. S. Cowan, & John J. Wurdack 30520*; U. S. National Herbarium No. 2,040,241.

This species bears a superficial resemblance to *A. suffultus* (Mik.) Par., but differs markedly from it by the presence of the midnerve and the pale florets.

Axonopus gracilis Black, sp. nov.

Perennis, erectus, ad basin teres; culmi 1 m alti, fortiter compressi, nonnumquam ancipitales, pallido-flavidi, glabri, nodis ca. 10, internodiis plus minusve aequalibus vel superioribus remotioribus; vaginae 10–30 cm longae, 3–5 mm latae, carinatae, superiores longiores, nonnumquam solutae, glabrae, summo latitudinem laminae aequantes; ligula 0.3–0.4 mm longa, breve ciliata; laminae 1–30 cm longae, 1–2 mm latae (duplicatae), plerumque duplicatae, adscendentes vel erectae, rigidae, obtusae, basi pilosae ciliataeque pilis ad 2 mm longis, superiores glabrescentes; inflorescentiae terminales, pedunculis crassis, ad 65 cm longis; panicula 10–15 cm longa, axi 2–4 cm longo; racemi 3–4, adscendentes, 4–12 cm longi, in axillis molliter, breviter pilosi pilis brevibus et pilis paucis longis; rachis 0.3–0.4 mm lata, flexuosa, atropurpurea vel viridescens marginibus scabrida, in 25 mm 8.5–11 spiculis praedita; spiculae 2.6–2.7 mm longae, 0.7 mm latae, pallidae, elliptico-ovatae, obtusae vel minute apiculatae; gluma lemma sterile aequans, 4-nervis, nervo mediano plerumque suppresso; pedicellus brevissimus; flosculus spiculae longitudinem aequans, pallido-brunneo-nitens, glaber, 1–2 pilis microscopicis apice praeditus.

Erect perennial, leafy throughout, the base terete; culm 1 m high, strongly flattened, 2.5–3.0 mm wide, the edges often blade-like, glabrous, pale yellow; nodes 10 or more, glabrous, the lower ones 2–3 cm apart, the upper ones more remote; sheaths 10–30 cm long, 3–5 mm wide, the upper ones longest, equaling the width of the blade or with a slight constriction at the junction with the blade, glabrous, keeled, often rose-tinted toward the summit, the margins frequently hyaline, the outer ones finally breaking up into a fibrous mass; ligule 0.3–0.4 mm long, the hairs about 0.2 mm long; blades 1–30 cm long, 1–2 mm wide (folded), mostly folded, stiff, ascending to erect, attenuate, the apex rounded, the base hairy, ciliate, the hairs up to 2 mm long; penduncles 1–2, barely exserted or long-exserted, 65 cm long, as much as 1 mm broad, sometimes compressed; panicles 10–15 cm long, the axis 2–4 cm long; racemes 3–4, ascending, 4–12 cm long, the axils with short dense hairs and a few long hairs intermixed; rachis 0.3–0.4 mm wide, dark purple or green, scabrous on the margins; spikelets 8.5–11 per 25 mm, 2.6–2.7 mm long, 0.7 mm wide, pale green, elliptic-ovate, obtuse or minutely apiculate, the pedicels 0–0.2 mm long; glume and sterile lemma equal, 4-nerved, the midnerve usually suppressed (rarely prominent), when 4, the outer

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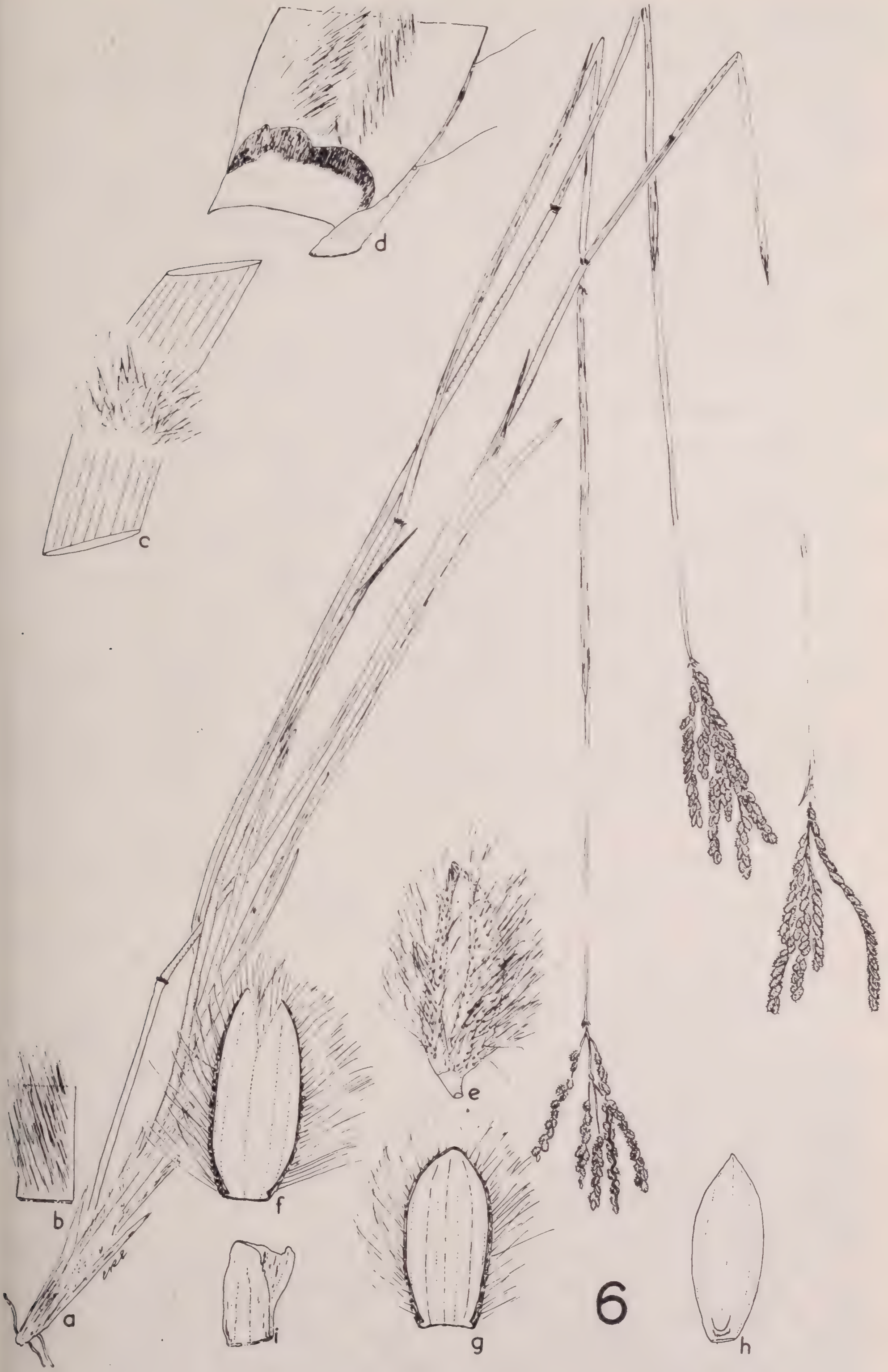
Explanation of figure 6

FIG. 6. *Paspalum canum* Sohns. *a*, plant, habit sketch; *b*, portion of basal sheath; *c*, node; *d*, ligule and upper surface of blade; *e*, spikelet; *f*, second glume; *g*, sterile lemma; *h*, fertile lemma; *i*, lodicule. *a* × ½; *b*-*h* × 8; *i* × 20. Type.



6

nerves approximate, glabrous; fertile floret equaling the spikelet in length, pale brown, shiny, glabrous or with 1–2 minute hairs at the apex.

TYPE: infrequent, southeast ridge and savanna slopes, alt. 1700 m, Cerro Sipapo (Paráque), Terr. Amazonas, Venezuela, December 20, 1948, *Bassett Maguire & Louis Politi 27818;* New York Botanical Garden.

Paspalum canum Sohns, sp. nov. Figure 6.

Perenne, dense caespitosum; culmi erecti, 60–75 cm alti, glabri, nodi pilosi; vaginae basi carinatae, dense adpresso-pilosae, vaginae culmorum glabrae vel propre basin interdum leviter pilosae; ligula membranacea, 0.5–0.6 mm longa; laminae 2–20 cm longae, 2–4 mm latae, supra dense adpresso-hirsutae, subtus glabrae vel leviter adpresso-hirsutae; inflorescentia 5–7.5 cm longa; racemi 5–6, axillae dense pilosae; axis racemi sinuosus; spiculae solitariae, 3–3.6 mm longae; gluma superior et lemma sterile dorso valide papilloso-pilosa; gluma superior lemma sterile subaequans, 7-nervis; lemma fertile pallidum, glabrum, 7-nerve; stamina 3; antherae 2–2.1 mm longae; lodiculae 2, 0.3–0.4 mm longae.

Perennial; caespitose, the culms erect, 60–75 cm tall, glabrous, nodes hairy; bases of old sheaths keeled, overlapping, densely appressed hairy; sheaths of culm-blades glabrous except near the base on the margins sometimes sparingly pilose; ligule a membranaceous rim 0.5–0.6 mm long; blades 2–20 cm long, 2–4 mm wide, the uppermost blades short, the upper surface with prominent nerves, densely appressed-hirsute over the midnerve and gradually less toward the margins, the margins papillose-pilose, lower surface sparingly appressed-hirsute to glabrous; inflorescence 5–7.5 cm long, with 5 to 6 racemes, densely hairy in the axils of the raceme; axis of the raceme sinuous and sharply angled; spikelets solitary, 3–3.6 mm long (average length of ten spikelets 3.3 mm); second glume and sterile lemma prominently papillose-pilose over the back, hairs up to 1.5 mm long; second glume 5-nerved; sterile lemma slightly shorter than the fertile lemma, 7-nerved; fertile lemma pale, smooth, 7-nerved; stamens 3; anthers 2.0–2.1 mm long; stigmas plumose, styles free to top of the ovary; lodicules 2, 0.3–0.4 mm long.

TYPE: frequent along stream course, east slopes of Serra Marico, alt. 1100 m, Terr. Rio Branco, Brazil, December 16–18, 1954, *Bassett Maguire & Celia K. Maguire 40349;* U. S. National Herbarium No. 2,182,187.

This species belongs to the *Lachnea* group of *Paspalum* and is related to *P. lachneum* Nees and *P. verrucosum* Hack.

Panicum supernum Swallen, sp. nov.

Perenne; culmi dense caespitosi, graciles, erecti, ramosi ramis appressis; vaginae internodiis multo longiores, glabrae; ligula brevissima, erosa; laminae 2–4 cm longae, involutae, erectae vel curvatae, subtus glabrae, supra pilosae, marginibus ciliatae; paniculae fragiles 2–6 cm longae, ramis filiformibus adscendentibus paucifloris; spiculae longipedicellatae, 1.4 mm longae, ellipticae, glabrae; gluma prima angusta, acuta vel subobtusa spicula 1/2 brevior; gluma secunda et lemma sterile obtusa, gluma fructu 1/4 brevior, lemma fructu longius; fructus acutus, albus, striatus.

Perennial; culms slender, densely tufted, strictly erect, branching from the middle and upper nodes, the branches closely appressed; sheaths much longer than the internodes, glabrous; ligule a very short, thin, erose membrane; blades mostly 2–4 cm long, involute, blunt, straight or curved, glabrous on the outer surface, pilose on the inner surface, ciliate, the hairs mostly enclosed; panicles fragile, exserted on very slender peduncles, 2–6 cm long, the filiform branches ascending, few-flowered; spikelets very long-pedicellate, 1.4–1.5 mm long, elliptic, glabrous; first glume narrow, acute or subobtuse, half as long as the spikelet; second glume and sterile lemma obtuse, the glume 3/4 as long as the fruit, the lemma exceeding it; fruit acute, white, striate.

TYPE: occasional on savanna on summit of Cerro Guanay, alt. 1800 m, Amazonas, Venezuela, February 4, 1951, *Bassett Maguire, Kathleen D. Phelps, Charles B. Hitchcock & Gerald Budowski 31751;* U. S. National Herbarium No. 2,078,752.

Panicum vigoratum Swallen, sp. nov.

Perenne rhizomatosum; culmi robusti, erecti, 1.5 m alti; vaginae internodiis 1/3–1/2 breviores, deciduae, glabrae, in ore pilosae; ligula 0.5–1 mm longa, ciliata; laminae 40–45 cm longae, 5–6 mm latae, attenuatae, marginibus scabrissimae; panicula 20 cm longa, 2 cm lata, ramis anguste adscendentibus, scaberulis; spiculae 2.5 mm longae, binae, appressae, glabrae; gluma prima ca. 2 mm longa, abrupte acuminata; gluma secunda et lemma sterile aequalia fructu longiora; antherae 1 mm longae.

Perennial; culms coarse, erect from strong rhizomes, about 1.5 m high; sheaths mostly half to two thirds as long as the internodes, loose, somewhat divergent or rather readily deciduous, glabrous, hairy at the throat; ligule 0.5–1 mm long, ciliate; blades firm, 40–45 cm long, 5–6 mm wide, attenuate, narrowed toward the base, the margins very scabrous; panicle (immature) 20 cm long, 2 cm wide, partly enclosed in the sheath, the slender branches rather narrowly ascending, scaberulous; spikelets 2.5 mm long, glabrous, appressed, in pairs, unequally pedicellate; first glume broad, clasping, abruptly acuminate, about 2 mm long; second glume and sterile lemma equal, pointed beyond the fruit; anthers 1 mm long.

TYPE: abundant and dominant around savanna margins, Sabana de Santo, Río Guaviarito, Cerro Guanay, Amazonas, Venezuela, January 23, 1951, *Bassett Maguire, Kathleen D. Phelps, Charles B. Hitchcock & Gerald Budowski 31601*; New York Botanical Garden.

This species is allied to *Panicum altum* Hitchc. & Chase which differs in having larger spikelets, the first glume less acuminate, and anthers 1.5 mm long.

Panicum deciduum Swallen, sp. nov.

Perenne; culmi erecti usque ad 4 m alti, glabri, ex nodis intermediis ramis elongatis; vaginae internodiis multo breviores, glabrae, deciduae; ligula ca. 1 mm longa, ciliata; laminae 9 cm longae, 8 mm latae, acuminatae, subtus basi pilosae, marginibus minute scabrae; ramorum laminae breviores; paniculae 3–7 cm longae, 1–3 cm latae, densae, ramis paucis adscendentibus usque ad 4 cm longis; spiculae brevipedicellatae, 3–3.2 mm longae, villosae; glumae aequales, acutae; lemma sterile acutum glumis paulo brevius; fructus stipitatus, 1.5 mm longus, acutus, albus, glabrus, lucidus.

Perennial; culms erect, apparently without rhizomes, as much as 4 m high, bearing long branches from the middle nodes, glabrous; sheaths very much shorter than the internodes, loose, readily deciduous, glabrous, ligule about 1 mm long, ciliate; blades of the midculm about 9 cm long, 8 mm wide, acuminate, pilose on the undersurface at the base, the margins minutely scabrous, the blades of the branches gradually smaller; panicles 3–7 cm long, 1–3 cm wide, rather dense, the few branches stiffly ascending, not more than 4 cm long; spikelets short-pedicellate, 3–3.2 mm long, obscured by the long silky hairs; glumes equal, acute; sterile lemma similar to the glumes but a little shorter; fruit stipitate, 1.5 mm long, acute, white, smooth and shining.

TYPE: locally frequent, northwest slopes of Cerro Yapacana, alt. 800–1000 m, Río Orinoco, Amazonas, Venezuela, January 1, 1951, *Bassett Maguire, R. S. Cowan & John J. Wurdack 30517;* U. S. National Herbarium No. 2,040,239.

This unusual species probably belongs in the *Virgata* group. The tall branching culms with small hairy panicles are very different from those of any other species.

Panicum appressifolium Swallen, sp. nov.

Perenne; culmi erecti, ramosi, 90 cm alti, nodiis dense pubescentibus; vaginae inferiores internodia aequantes, superiores internodiis multo longiores, in collo dense pubescentes, marginibus dense ciliatae; ligula membranacea, 0.2 mm longa; laminae erectae, lanceolatae, acuminatae, 7–9 cm longae, usque ad 9 mm latae, suprema multo reducta; paniculae 9–12 cm longae, purpureae, ramis gracilibus anguste adscendentibus ramulis divergentibus flexuosis; spiculae 2.2 mm longae, glabrae; gluma prima spicula 1/3–1/2 brevior, acuta vel subacuta, 1-nervis; gluma secunda et lemma sterile subaequalia, 7-nervia, fructu longiora; fructus 1.7 mm longus, ellipticus, acutus, striatus, minute papillosus.

Perennial; culms rather coarse, erect, about 90 cm high, the nodes densely pubescent, branching; lower sheaths about as long as the internodes, much overlapping upward, the uppermost elongate reaching or nearly reaching the base of the panicle, densely pubescent on the collar, the margins densely ciliate; ligule membranaceous, about 0.2 mm long; blades lanceolate, acuminate, erect, those of the midculm 7–9 cm long, as much as 9 mm wide, smaller upward, the uppermost greatly reduced; panicles 9–12 cm long, purple, the slender branches rather narrowly ascending, straight or flexuous, the branchlets divergent, usually flexuous; spikelets 2.2 mm long, glabrous, the pedicels of the lateral ones about as long as the spikelet; first glume 1/2–2/3 as long as the spikelet, acute or subacute, 1-nerved or sometimes with faint lateral nerves; second glume and sterile lemma subequal, 7-nerved, pointed beyond the fruit, the lemma with a palea but without a staminate flower; fruit 1.7 mm long, elliptic, acute, striate, minutely papillose roughened, straw-colored.

TYPE: occasional in savanna, Samwarakna-tipu (Holi-tipu), alt. 1100 m, Kamarang River, Wenamu Trail, British Guiana, November 10, 1951, *Bassett Maguire & D. B. Fanshawe 32564;* U. S. National Herbarium No. 2,078,797.

Also collected on Mt. Roraima, on the great sandstone boulders, Philipp Camp, November 7, 1927, *G. H. H. Tate 281.* This specimen had been referred to *Panicum carannense* Mez, a species allied to *P. parvifolium* Lam.

The following four species belong with the *Panicum granuliferum—Panicum micranthum* complex.

Panicum subcordatum Swallen, sp. nov.

Annuum; culmi decumbentes, ramosi, usque ad 50 cm longi, glabri, internodiis aequilongis; vaginae internodiis 1/2 breviores, sparse pilosae vel glabrae; ligula tenuis, arcuata, 0.5 mm longa; laminae adscendentes vel appressae, 2.5–4.5 cm longae, 5–9 mm latae, acutae, subcordatae supra ad basin pilosae; paniculae usque ad 9 cm longae, ramis solitariis adscendentibus ramulis filiformibus divergentibus, in axillibus pilosis; spiculae 1.2 mm longae, glabrae, pedicellis filiformibus spiculis multo longioribus; gluma prima angusta, acuta, spicula 1/2 brevior; gluma secunda obtusa fructu 1/4–1/3 brevior; lemma sterile acutum fructu longius; fructus acutus, plano-convexus, albus.

Annual; culms decumbent spreading, rooting at the nodes, rather freely branching, as much as 50 cm long, the internodes of nearly equal length, glabrous; sheaths about half as long as the internodes, sparsely pilose to glabrous; ligule thin, 0.5 mm long, high-arcuate; blades ascending or appressed, 2.5–4.5 cm long, 5–9 mm wide, acute, narrowed toward the base but rounded and clasping the culm, pilose on the upper surface near the base; panicles as much as 9 cm long, nearly as wide, the solitary branches ascending with filiform divergent branchlets, pilose in the axils; spikelets 1.2 mm long, glabrous, the filiform pedicels much longer than the spikelets; first glume narrow, acute, half as long as the spikelet; second glume obtuse, 2/3–3/4 as long as the fruit; sterile lemma acute, exceeding the fruit, containing a staminate flower; fruit acute, plano-convex, white.

TYPE: locally abundant around laja at mouth of Caño Arapacua, Río Pacimoni, alt. 120 m, Amazonas, Venezuela, April 8, 1953, *Bassett Maguire & John J. Wurdack 34917;* U. S. National Herbarium No. 2,116,125.

Panicum petrense Swallen, sp. nov.

Annuum; culmi graciles, caespitosi, erecti, 25–30 cm alti, ramosi, ramis appressis; vaginae internodiis paulum breviores; ligula arcuata, tenuis, 0.3 mm longa; laminae 1.5–3 cm longae, 1.5–3 mm latae, vel superiores breviores, glabrae vel basi sparse pilosae; paniculae 1.5–3 cm longae, ramis gracilibus scaberulis anguste adscendentibus; spiculae 1.2–1.3 mm longae, pilosae; gluma prima acuta vel subobtusa spicula 1/2 brevior; gluma secunda obtusa, fructu 1/4–1/3 brevior; lemma sterile acutum fructu longius; fructus 0.8 mm longus, ovatus, albidus, striatus.

Annual; culms slender, densely tufted, erect, 25–30 cm high, rather freely branching, the branches appressed; sheaths a little shorter than the internodes or overlapping on the branches; ligule arcuate, very thin, about 0.3 mm long; blades 1.5–3 cm long, 1.5–3 mm wide, or the uppermost smaller, bluish-green, ascending or appressed, glabrous or with a few scattered long hairs toward the base; panicles 1.5–3 cm long, the slender usually solitary branches narrowly ascending, or somewhat spreading at maturity, scaberulous; spikelets 1.2–1.3 mm long, pilose; first glume acute or subobtuse, half as long as the spikelet; second glume 2/3–3/4 as long as the fruit; sterile lemma pointed beyond the fruit, enclosing a palea and staminate flower; fruit 0.8 mm long, ovate, white, striate.

TYPE: abundant in moist sand on exposed rocks, 15 km above San Fernando de Atabapo, Río Atabapo, Río Orinoco, Amazonas, Venezuela, October 17, 1950, *Bassett Maguire 29259;* U. S. National Herbarium No. 2,040,198.

Panicum gracilissimum Swallen, sp. nov.

Annuum; culmi gracilissimi, erecti vel adscendentes, simplices vel ramosi, internodiis superioribus 3.5–5 cm longis; vaginae internodiis multo breviores, glabrae; ligula arcuata, tenuis, 0.5 mm longa; laminae 7–18 mm longae, 0.5–1.3 mm latae, appressae, glabrae vel sparse pilosae; paniculae 3–5 cm longae ramis filiformibus solitariis adscendentibus in axillis pilis longis; spiculae 1–1.2 mm longae, pilosae vel papilloso-pilosae, pedicellis filiformibus 3–4 mm longis; gluma prima acuta spicula 1/2 brevior; gluma secunda obtusa fructu 1/4–1/3 brevior; lemma sterile acutum, fructu longius; fructus acutus, lucidus, albus.

Annual; culms very slender, erect or ascending, 24–28 cm high, simple or branching, the upper internodes mostly 3.5–5 cm long; sheaths much shorter than the internodes, glabrous; ligule arcuate, thin, 0.5 mm long; blades 7–18 mm long, 0.5–1.3 mm wide, glabrous or sparsely pilose, usually appressed; panicles 3–5 cm long, or those of the branches smaller, the solitary, filiform branches and branchlets stiffly ascending, with long fine hairs in the axils; spikelets 1–1.2 mm long, pilose or papillose-pilose, the filiform pedicels mostly 3–4 mm long; first glume acute, about half as long as the spikelets; second glume obtuse, 2/3–3/4 as long as the fruit; sterile lemma subacute, pointed beyond the fruit; fruit acute, white, shining.

TYPE: frequent in moist pockets on crystalline laja, 1–1.5 km east of Hotel Amazonas, Puerto Ayacucho, alt. 100–200 m, Great Rapids of the Orinoco, Terr. Amazonas, Venezuela, November 7, 1953, *Bassett Maguire, John J. Wurdack & George S. Bunting 36043;* U. S. National Herbarium No. 2,182,149.

The very slender culms with long internodes and small blades are characteristic.

Panicum subinclusum Swallen, sp. nov.

Perenne; culmi erecti 30–45 cm alti, pauciramosi; vaginae internodiis paulum breviores, glabrae; ligula arcuata, 0.5–1 mm longa; laminae 2.5–6.5 cm longae, 3–9 mm latae, acutae, appressae, basi sparse longe pilosae; paniculae usque ad 6 cm longae, 2 cm latae ramis gracilissimis adscendentibus; spiculae 1.1–1.2 mm longae, acutae, pilosae vel papilloso-pilosae; gluma prima acuta vel subacuta spicula ca. 1/2 brevior; gluma secunda obtusa fructu brevior; lemma sterile subacutum fructu longius; fructus 1 mm longus, plano-convexus, subacutus.

Perennial; culms erect, 30–45 cm high, sparingly branching, the branches apparently somewhat spreading; sheaths nearly as long as the internodes, glabrous; ligule high-arcuate 0.5–1 mm long; blades 2.5–6.5 cm long, 3–9 mm wide, acute, narrowed toward the base, bearing a few long hairs on the upper surface toward the base, appressed; panicles as much as 6 cm long, 2 cm wide, or smaller on the branches, partly enclosed in the sheath, the very slender branches ascending; spikelets 1.1–1.2 mm long, acute, pilose or papillose-pilose; first glume acute or subacute, half as long or a little more than half as long as the spikelet; second glume obtuse, shorter than the fruit; sterile lemma subacute, slightly exceeding the fruit, containing a well developed palea and staminate flower; fruit 1 mm long, strongly plano-convex, subacute.

TYPE: locally abundant, wet places on rocks, 15 km above San Fernando de Atabapo, Río Atabapo, Río Orinoco, Amazonas, Venezuela, October 17, 1950, *Bassett Maguire 29271;* U. S. National Herbarium No. 2,040,199.

The perennial habit, relatively small, partly included panicles, and large appressed blades are characteristic.

Panicum fonticolum Swallen, sp. nov.

Annuum? Culmi 20–35 cm longi, adscendentes, parte inferiore decumbentes vel prostrati; vaginae glabrae vel sparse pilosae internodiis multo breviores; ligula 0.4 mm longa, tenuis, truncata; laminae 2–3.5 cm longae, 2–4 mm latae, acuminatae, patentes, glabrae, tenuis; paniculae 2.5–6 cm longae, ramis solitariis adscendentibus ex basi ramosis; spiculae 1.3–1.4 mm longae, ellipticae vel obovatae, acutae, sparse pilosae; gluma prima angusta, acuta, 1-nervis, spicula 1/3–1/2 brevior; gluma secunda et lemma sterile aequalia fructu longiora; fructus 1 mm longus, ellipticus, subobtusus, albus, striatus.

Annual? Culms 20–35 cm long, ascending, the lower part decumbent or prostrate with short internodes, leafless or the leaves soon deciduous, the upper internodes gradually longer; sheaths glabrous or very sparsely pilose, much shorter than the internodes; ligule thin, truncate, about 0.4 mm long; blades 2–3.5 cm long, 2–4 mm wide, acuminate, somewhat narrowed toward the base, thin, spreading, glabrous; panicles 2.5–6 cm long, the slender solitary branches stiffly ascending, branching from near the base, the branchlets spreading, few-flowered; spikelets 1.3–1.4 mm long, elliptic or obovate, acute, sparsely pilose; first glume 1/2–2/3 as long as the spikelet, narrow, 1-nerved, acute; second glume and sterile lemma equal, pointed beyond the fruit, the lemma without a palea or staminate flower; fruit 1 mm long, broadly elliptic, subobtuse, white, striate.

TYPE: on waterfall, in spray, Culebra Creek, alt. 1500–1600 m, Cerro Duida, Río Cunucunuma, Amazonas, Venezuela, November 21, 1950, *Bassett Maguire, R. S. Cowan & John J. Wurdack 29636*; U. S. National Herbarium No. 2,040,215.

Resembling *Panicum rivale* Swallen, but differing in having shorter-pediceled, pilose spikelets, truncate rather than arcuate ligule, and acuminate blades.

The following seven species, with *P. wurdackii* and *P. steyermarkii,** are related to *Panicum loreum* Trin. Other species of this group previously described from the Guayana Highland are *P. eligulatum* N. E. Brown, *P. tropidoblephore* Tutin, *P. curvifolium* Swallen, and *P. tatei* Swallen. All are similar in habit, but differ markedly in specific characters. With the exception of *P. sipapoense* which has a short ligule, there is no differentiation between sheath and blade.

Panicum vannum Swallen, sp. nov.

Perenne; culmi ca. 90 cm alti; foliae confertae distichae; vaginae elongatae, compressae, ecarinatae basi dense pilosae laminis deciduis; laminae 30–40 cm longae, 10–13 mm latae, acuminatae apice naviculares, marginibus scabrae, interdum sparse pilosae; panicula 14 cm longa, 5 cm lata, ramis anguste adscendentibus; spiculae 2.8–3 mm longae; gluma prima acuta spicula 1/2 brevior carina scabra; gluma secunda et lemma sterile aequalia fructu longiora; fructus 2.4 mm longus, ellipticus, laevis, flavidus.

Perennial; culms about 90 cm high? (base wanting); basal leaves crowded, conspicuously distichous, forming a fan-shaped cluster; sheaths elongate, flattened but not keeled, rather densely pilose at the base; ligule wanting, the demarcation between sheath and blade not evident, although the blades are apparently deciduous; blades mostly 30–40 cm long, 10–13 mm wide, narrowed toward the base, acuminate with a firm navicular tip, the margins very scabrous, otherwise glabrous or with a few scattered long hairs; panicle 14 cm long, about 5 cm wide, the branches narrowly and stiffly ascending; spikelets 2.8–3 mm long; first glume acute, about half as long as the spikelet, the midnerve scabrous; second glume and sterile lemma equal, pointed beyond the fruit; fruit 2.4 mm long, elliptic, smooth, straw-colored.

TYPE: in old fruit; locally frequent in colonies on south slope of Cumbre Camp Caño toward Caño Grande, alt. 1500–1700 m, Cerro de la Neblina, Río Yatua, Amazonas, Venezuela, January 16, 1954, *Bassett Maguire, John J. Wurdack & George S. Bunting 37327;* U. S. National Herbarium No. 2,182,161.

Panicum sipapoense Swallen, sp. nov.

Perenne; culmi erecti ca. 60 cm alti; vaginae confertae ad basin dense villosae, planae; ligula 0.2–0.4 mm longa plerumque dense ciliata; laminae lineares, elongatae, usque ad 4 mm latae, ad basin attenuatae, basi longipilosae; panicula longe exserta, pyramidata, 12 cm longa, 14 cm lata ramis et ramulis patentibus; spiculae 2.7–2.8 mm longae, glabrae; gluma prima subobtusa spicula 1/2 brevior vel paulo longior vel brevior; gluma secunda et lemma sterile subobtusa fructum aequantia; lemma palea carinis ciliata; fructus 2.2–2.4 mm longus, laevis, flavidus.

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*Described in "Botany of the Chimantá Massif" (Mem. N. Y. Bot. Gard. 9:393–439. 1956.)

Perennial; culms erect, about 60 cm high; lower sheaths crowded, densely villous toward the base, becoming loose and flat; ligule 0.2–0.4 mm long, usually densely ciliate; blades linear, elongate, with a firm sharp tip, inrolled or flat, as much as 4 mm wide, attenuate toward the base, pilose with long hairs near the base, otherwise glabrous, even on the margins; panicle long-exserted, pyramidal, 12 cm long, about 14 cm wide, the branches and branchlets spreading; spikelets 2.7–2.8 mm long, glabrous; first glume broad, subobtuse, a little less to a little more than half the length of the spikelet; second glume and sterile lemma subobtuse, equalling the fruit, the lemma with a well developed palea, this ciliate on the keels; fruit 2.2–2.4 mm long, smooth, straw-colored.

TYPE: infrequent, rocks, Caño Profundo, Cerro Sipapo, Amazonas, Venezuela, January 14, 1949, *Bassett Maguire & Louis Politi 28364;* U. S. National Herbarium No. 2,040,188. Also referable to this species is *Bassett Maguire & Louis Politi 27919*, collected on banks, lower Caño Negro, 1400 m, Cerro Sipapo. The latter specimen is smaller, 40 cm high, with a smaller, scarcely exserted panicle, and the uppermost sheath is elongate with a very much reduced blade.

Panicum cowani Swallen, sp. nov.

Perenne; culmi erecti, robusti, 1.4 m alti, basi adscendentes vel decumbentes; foliae basi confertae, erectae vel curvatae, laminis 50 cm longis, usque ad 13 mm latis, subtus et supra dense pilosae; culmorum foliae 2 vel 3, vaginis elongatis internodiis multo brevioribus, subglabrae, laminis multo reductis; panicula 14 cm longa ramis adscendentibus vel patentibus ramulis divergentibus implicatis; spiculae 2.6–2.8 mm longae, glabrae; gluma prima acuta spicula ca. 1/2 brevior; gluma secunda et lemma sterile acuta, subaequalia; fructus adustus, acutus, 2.2 mm longus.

Perennial; culms rather coarse, erect, 1.4 m high, apparently from an ascending or decumbent base, the upper part of the culm rather soft and spongy; leaves mostly crowded on the lower part of the culm, erect or becoming loose and curled, the blades about 50 cm long, as much as 13 mm wide, densely and rather softly hairy on both surfaces; upper culm leaves two or three, the sheaths elongate but much shorter than the internodes, glabrous or nearly so except near the base, the blades greatly reduced; panicle 14 cm long, nearly as wide, the branches ascending to spreading, the branchlets spreading, implicate; spikelets (old) 2.6–2.8 mm long, glabrous; first glume acute, about half as long as the spikelet; second glume and sterile lemma equal or nearly so, acutish; fruit brownish, acute, 2.2 mm long.

TYPE: frequent, cumbre just south of valley head of Camp Caño, sabanita and scrub forest, alt. 2000 m, Serranía Parú, Río Parú, Caño Asísa, Río Ventuari, Amazonas, Venezuela, February 2, 1951, *R. S. Cowan & John J. Wurdack 31151*; U. S. National Herbarium No. 2,040,250. Since the spikelets are old, they may have been somewhat larger than indicated in the description.

Two other specimens, without spikelets, are tentatively referred to this species: *Bassett Maguire & Louis Politi 27681* from Lower Camp Savanna, Cerro Sipapo, Amazonas, Venezuela; and *Julian A. Steyermark 75777* from rocky plateau below summit of Apacará-tepuí, Chimantá Massif, Bolívar, Venezuela. Additional material may prove that these are distinct species.

Panicum inversum Swallen, sp. nov.

Perenne; culmi erecti, 1 m alti: vaginae in parte culmorum inferiore internodiis multo longiores, vix confertae, dense villosae, infimae glabrae laminis reductis; laminae 25–35 cm longae, 9–11 mm latae, subtus et supra dense pilosae; culmorum foliae 2, vagina suprema elongata basin paniculae attingens, glabra, transverse nervosa; panicula 14 cm longa, 3 cm lata, ramis gracilibus anguste adscendentibus vel appressis; spiculae 2.5–2.6 mm longae, pedicellis spicula multo longioribus; gluma prima spicula 1/3–1/2 brevior, obtusa, glabra vel carina scabra; gluma secunda et lemma sterile aequalia vel subaequalia fructum aequantia vel paulo longiora, lemma flore masculo, palea in carinis ciliata; fructus 2.3 mm longus, anguste ovatus, acutus, flavidus, laevis, lucidus.

Perennial; culms erect, 1 m high, the basal sheaths covering the lower third of the culm, well overlapping but not conspicuously crowded, densely villous, the lowermost glabrous with reduced blades; blades 25–35 cm long, 9–11 mm wide, rather densely pilose or villous on both surfaces; culm leaves 2, the upper sheath elongate, reaching the base of the panicle, glabrous, with strong transverse veins; panicle 14 cm long, about 3 cm wide, appearing rather dense, the slender branches narrowly ascending or appressed; spikelets 2.5–2.6 mm long, the pedicels usually much longer than the spikelet; first glume usually half as long as the spikelet, or rarely as much as 2/3 as long, obtuse, glabrous or sometimes scabrous on the midnerve; second glume and sterile lemma equal or nearly so, as long as or slightly longer than the fruit, the lemma with a well-developed palea and staminate flower, the palea ciliate on the keels; fruit 2.3 mm long, narrowly ovate, acute, yellowish, smooth and shining.

TYPE: common on summit, Cerro Guanay, alt. 1800 m, Caño Guaviarito, Río Manapiare, Río Ventuari, Amazonas, Venezuela, February 2, 1951, *Bassett Maguire, Kathleen D. Phelps, Charles B. Hitchcock & Gerald Budowski 31722;* U. S. National Herbarium No. 2,078,751.

Panicum auyanense Swallen, sp. nov.

Perenne; culmi erecti, 115 cm alti internodiis superioribus gracilibus elongatis; foliae basi confertae, curvatae, vaginis ad basin villosis ad summum dense villosis, laminis 25–30 cm longis, 6–9 mm latis, ad basin dense villosis, marginibus scabris; culmorum vaginae elongatae internodiis breviores laminis reductis; panicula 10–11 cm longa, 3–7 cm lata, longe exserta ramis anguste adscendentibus in parte superiore ramosis; spiculae 3.2–3.4 mm longae, glabrae; gluma prima obtusa vel subacuta, spicula ca. 1/2 brevior 3-nervosa; gluma secunda et lemma sterile tenuia nervis prominentibus, acuta vel subobtusa, gluma fructu paulo brevior, lemma fructum superans; fructus 2.8 mm longus, acutus, flavidus, laevis, lucidus.

Perennial; culms erect from a rhizome-like base, 115 cm high, the upper internodes slender, elongate; basal leaves crowded, becoming curled with age, the sheaths villous toward the base and densely villous toward the summit, otherwise glabrous; blades 25–30 cm long, 6–9 mm wide, densely villous on both surfaces toward the base, becoming glabrous toward the tip, the margins sometimes scabrous; culm sheaths elongate but shorter than the internodes, the blades reduced; panicle 10–11 cm long, 3–7 cm wide, long exserted, the branches stiffly and usually narrowly ascending, branching from well below the middle; spikelets 3.2–3.4 mm long, glabrous; first glume obtuse or subacute, about half as long as the spikelet, strongly 3-nerved; second glume and sterile lemma rather thin with prominent nerves, acute or subobtuse, the glume a little shorter than the fruit, the lemma somewhat exceeding it; fruit 2.8 mm long, acute, yellowish, smooth and shining.

TYPE: Auyan-tepuí, alt. 2200 m, Bolívar, Venezuela, December 1937—January 1938, *G. H. H. Tate 1288.*

This specimen was referred previously to *Panicum curvifolium* Swallen, but in the latter species the spikelets are much smaller (2.2 mm), the panicles are larger with more spreading branches, the culms are coarser, and the blades are glabrous except just above the ligule area.

Panicum kavanayense Swallen, sp. nov.

Perenne; culmi erecti ca. 75 cm alti; foliae basi confertae vaginis basi dense villosis ad summum sparse vel dense pilosis, curvatis, laminis 20–25 cm longis, 4–7 mm latis, erectis, pungentibus, scaberulis, basi longe pilosis; culmorum foliae 2 laminis reductis; panicula 7 cm longa, ca. 8 cm lata, ramis adscendentibus ad basin ramosis, ramulis implicatis; spiculae 2.3–2.4 mm longae, purpureae, plus minusve confertae, pedicellis lateralibus spicula brevioribus; gluma prima lata, obtusa, marginibus hyalinis, spicula 1/2 brevior, carina scabra, nerviis lateralibus obscuris; gluma secunda obtusa fructu 1/4–1/3 brevior; lemma sterile fructum aequans, subacutum, plus minusve cucullatum; fructus 1.8 mm longus, acutus, flavidus, laevis, lucidus.

Perennial; culms erect, about 75 cm high; leaves mostly basal, becoming loose and curled with age, the sheaths densely villous at the very base, sparsely to rather densely hairy near the summit, otherwise glabrous, the blades mostly 20–25 cm long, 4–7 mm wide, erect, pungently pointed, finely scabrous, with long hairs at the base; culm leaves two with much reduced blades; panicle 7 cm long, about 8 cm broad, the branches ascending, at least some of them branching from near the base, the branchlets implicate; spikelets 2.3–2.4 mm long, purple, somewhat clustered toward the ends of the branchlets, the lateral pedicels usually shorter than the spikelet; first glume broad, obtuse, with hyaline margins, usually a little less than half as long as the spikelet, scabrous on the midnerve to nearly glabrous, the lateral nerves obscure; second glume obtuse, 2/3–3/4 as long as the fruit; sterile lemma as long as the fruit, subacute, somewhat cucullate; fruit 1.8 mm long, acute, yellowish, smooth and shining.

TYPE: frequent in savanna at Kavanayen, alt. 1200 m, Gran Sabana, Bolívar, Venezuela, March 30, 1952, *Bassett Maguire 33701;* U. S. National Herbarium No. 2,078,781.

Panicum maguirei Swallen, sp. nov.

Perenne; culmi erecti, 75 cm alti, foliis basi confertis; vaginae basi dense villosae, summo sparse pilosae, leviter curvatae; laminae 26–30 cm longae, 8–10 mm latae supra basi pilosae marginibus scabrae; culmorum foliae 2, vagina suprema elaminata; panicula longe exserta, 10 cm longa, ramis paucis adscendentibus vel reflexis ramulis paucis brevibus paucifloris; spiculae 2.5–2.7 mm longae, purpureae; gluma prima obtusa spicula 1/2 brevior; gluma secunda obtusa fructu brevior; lemma sterile fructum aequans vel paulo longius; fructus 2.4 mm longus, ellipticus, subacutus, laevis, lucidus.

Perennial; culms erect, 75 cm high, the leaves crowded at the base; sheaths densely villous at the very base, sparsely pilose at the summit, otherwise glabrous, becoming flat and loosely curled; blades 26–30 cm long, 8–10 mm wide, narrowed toward the base, more or less pilose above the ligule area, the margins usually scabrous; culm leaves two, the upper sheath bladeless; panicle long-exserted, 10 cm long, about as wide, the branches few, ascending to reflexed, bearing a few short branchlets above the middle; spikelets mostly 3 or 4 toward the end of the branchlets, 2.5–2.7 mm long, purple; first glume obtuse, half as long as the spikelet; second glume obtuse, shorter than the fruit; sterile lemma subacute, as long as or slightly longer than the fruit; fruit 2.4 mm long, elliptic, subacute, brownish, smooth and shining.

TYPE: bunch grass on savanna; lateral south drainage of "North Valley", alt. 1700 m, Cerro Guaiquinima, Río Paragua, Bolívar, Venezuela, January 2, 1952, *Bassett Maguire 32899;* New York Botanical Garden.

Ichnanthus amplus Swallen, sp. nov.

Perennis; culmi robusti, erecti, 2.25 m alti, foliosi nodis pilosis; vaginae internodiis longiores, glabrae, marginibus papilloso-ciliatae collo dense villosae; ligula membranacea, 0.6 mm longa; laminae usque ad 45 cm longae, 3.6 cm latae, acuminatae, ad basin angustiores, ad margines papillosae vel papilloso-pilosae, marginibus scabrae; panicula 45 cm longa, laxa, ramis verticellatis, scabris, inferioribus usque ad 30 cm longis, ramulis divergentibus; spiculae 3.6–3.8 mm longae; gluma prima spicula paulum brevior, acuta, scabra, marginibus sparse pilosa, 3–5-nervis; gluma secunda et lemma sterile aequalia, subobtusa, fructu paulum longiora, 5–7-nervia, plus minusve scabra; fructus 2.8 mm longus, subacutus, laevis, lucidus, alis 0.5 mm longis.

Perennial; culms coarse, erect, 2.25 m high, leafy, the nodes appressed-pilose; sheaths all longer than the internodes, glabrous, the margins papillose-ciliate, the collar densely villous, the mouth truncate; ligule membranaceous, 0.6 mm long with a line of hairs behind it 1–3 mm long; blades as much as 45 cm long, 3.6 cm wide, acuminate, gradually narrowed to the base but not petiolate, papillose or papillose-hairy near the margins at the base, the margins scabrous; panicle 45 cm long, rather lax, the branches in somewhat distant verticels, scabrous, the lower ones as much as 30 cm long, the branchlets spreading; spikelets 3.6–3.8 mm long; first glume nearly as long as the spikelet, acute, scabrous, occasionally with a few hairs on the margins, 3-nerved or sometimes 5-nerved; second glume and sterile lemma equal, subobtuse, slightly longer than the fruit, 5-nerved or sometimes 7-nerved, more or less scabrous; fruit 2.8 mm long, subacute, brown at maturity, smooth and shining; wings 0.5 mm long.

TYPE: locally frequent in secondary thicket by clearing, Kataima, alt. 550 m, Upper Mazaruni River, British Guiana, November 17, 1951, *Bassett Maguire & D. B. Fanshawe 32633;* New York Botanical Garden.

Related to *Ichnanthus ichnodes* (Griseb.) Hitchc. & Chase which has much smaller blades and spikelets.

Ichnanthus tectus Swallen, sp. nov. Figure 7.

Perennis; culmi erecti 115 cm alti; vaginae compressae, glabrae, internodiis multo longiores suprema elongata basin paniculae attingens; laminae acuminatae ad basin longiattenuatae inferiores ca. 65 cm longae (superiores breviores), 8–10 mm latae, supra basi dense pilosae marginibus scabrissimae; panicula 25 cm longae, erectae, ramis adscendentibus vel patentibus, scabrissimis, inferioribus 7–8 cm longis; spiculae 5 mm longae, appressae, dense scabrae, pedicellis spiculis brevioribus; gluma prima 4 mm longa, obtusa; gluma secunda et lemma sterile subaequalia, obtusa, fructu longiora; fructus 4 mm longus, acutus, summo scabrus, stipitatus, alis 1.5 mm longis tenuibus plus minusve flabellatis.

Perennial; culms erect, 115 cm high; sheaths much longer than the internodes, the uppermost elongate, nearly reaching the base of the panicle, compressed, glabrous; blades acuminate, long-attenuate toward the base, the lower ones about 65 cm long, the upper ones shorter, 8–10 mm wide, strongly scabrous on the margins, densely hairy on the upper surface at the base; panicle 25 cm long, erect, the branches very scabrous, stiffly ascending or spreading, the lower ones 7–8 cm long; spikelets 5 mm long, appressed, densely scabrous, the pedicels

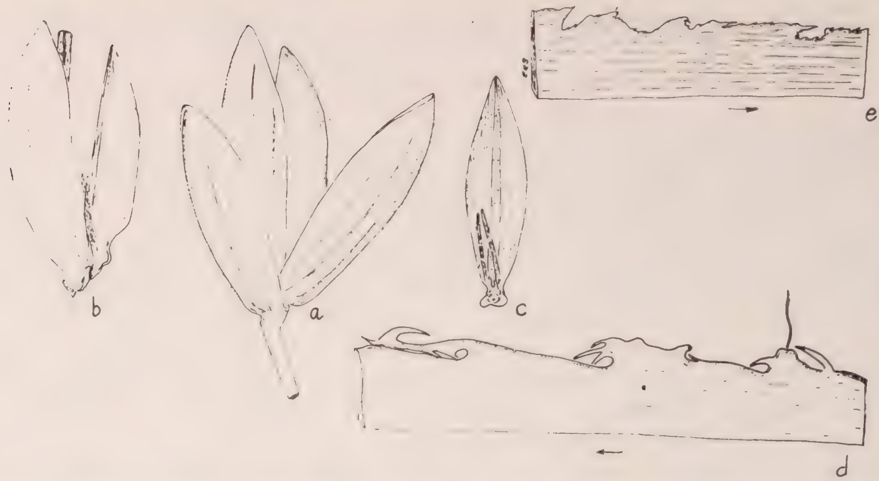

FIG. 7. *Ichnanthus tectus* Swallen. *a*, spikelet; *b*, sterile and fertile lemmas; *d*, *e*, margin of blade. *a-c* × 8; *d*, *e* × 20.

shorter than the spikelets; first glume 4 mm long, obtuse; second glume and sterile lemma subequal, obtuse, exceeding the fruit, the lemma with a well developed palea; fruit 4 mm long, acute, scabrous at the summit, the base prolonged in a thickish stipe, the articulation on the ventral side; wings 1.5 mm long, thin, somewhat flabellate.

TYPE: frequent, cumbre just south of valley head of Camp Caño, sabanita and scrub forest, alt. 2000 m, Serranía Parú, Río Parú, Caño Asísa, Río Ventuari, Terr. Amazonas, Venezuela, February 2, 1951, *R. S. Cowan & John J. Wurdack 31139;* U. S. National Herbarium No. 2,040,249.

Ichnanthus angustus Swallen, sp. nov.

Perennis; culmi erecti 50–100 cm alti; vaginae internodiis longiores, glabrae, suprema elongata; ligula dense ciliata ca. 2 mm longa; laminae 37–50 cm longae, 9–11 mm latae, acuminatae, supra basi plus minusve pilosae, marginibus irregularis scabris; paniculae angustae, 13–20 cm longae, ramis anguste adscendentibus scabrissimis; spiculae 4 mm longae, scabrae; gluma prima 3 mm longa, obtusa; gluma secunda et lemma sterile subaequalia, obtusa, fructu paulum breviora; fructus 3.5–3.6 mm longus, acutus, stipitatus, alis tenuibus obtusis 1.3–1.6 mm longis.

Perennial; culms erect, 50–100 cm high; sheaths overlapping, glabrous, the uppermost elongate; ligule a dense rim of hairs about 2 mm long; blades 37–50 cm long, 9–11 mm wide, acuminate, narrowed toward the base but not long attenuate, more or less hairy on the upper surface at the base, the margins irregularly serrate, very scabrous; panicles narrow, 13–20 cm long, the branches very scabrous, rather narrowly ascending; spikelets 4 mm long, mostly densely scabrous; first glume 3 mm long, obtuse; second glume and sterile lemma subequal, obtuse, a little longer to slightly shorter than the fruit, the lemma enclosing a well developed palea; fruit 3.5–3.6 mm long, acute, the base prolonged in a stipe, the articulation on the ventral side; wings thin, obtuse, 1.3–1.6 mm long.

TYPE: Cumbre, alt. 1800 m, Serranía Parú, Río Ventuari, Río Parú, Caño Asísa, Terr. Amazonas, Venezuela, February 11, 1949, *Kathleen D. Phelps & Charles B. Hitchcock 476;* U. S. National Herbarium No. 2,078,745.

Ichnanthus tectus and *I. angustus* are related to *I. serratus* Swallen and *I. longifolius* Swallen described from Mt. Duida. These four species are similar in having blades with irregular scabrous margins and stipitate fruit, the articulation on the ventral side, the scar circular. They are differentiated as follows:

Blades 4–5 mm wide, about 30 cm long; panicles lax, the pedicels slender, usually much longer than the spikelets. *I. serratus.*
Blades 8–11 mm wide, usually more than 50 cm long; panicles stiff, the pedicels usually much shorter than the spikelets.
  Blades attenuate to a fine point, smooth and shining; spikelets 3.4–3.6 mm long. *I. longifolius.*
  Blades acuminate, not shining; spikelets 4–5 mm long.
    Spikelets 5 mm long; blades long-attenuate to the base; panicle branches spreading. *I. tectus.*
    Spikelets 4 mm long; blades narrowed but not long-attenuate to the base; panicle narrow, the branches ascending. *I. angustus.*

Lasiacis acuminata Swallen, sp. nov.

Culmi erecti, 2 m alti, ramis gracilibus usque ad 50 cm longis; ramorum vaginae 3–4 cm longae internodiis longiores, pilosae vel ad summum hirsutae, vel subglabrae, collo dense villosae margine ciliatae; ligula firma, 0.4–0.8 mm longa; laminae 7–12 cm longae, 5–10 mm latae, acuminatae, dense pubescentes vel pilosae; paniculae 9–17 cm longae, ramis solitariis adscendentibus, scabris, paucifloris, inferioribus 6–8 cm longis; spiculae 3.6–3.8 mm longae, pedicellis 5–15 mm longis, scabris.

Culms erect, 2 m high, with slender branches as much as 50 cm long; sheaths of the branches mostly 3–4 cm long, longer than the internodes, densely pilose or hirsute toward the summit or nearly glabrous, densely villous on the collar, one of the margins ciliate; ligule firm, 0.4–0.8 mm long; blades 7–12 cm long, 5–10 mm wide, acuminate, densely pilose or pubescent on both surfaces; panicles 9–17 cm long, the solitary branches narrowly to widely ascending, few-flowered, scabrous, the lower ones 6–8 cm long; spikelets 3.6–3.8 mm long, the pedicels 5–15 mm long, rarely longer or shorter, scabrous.

TYPE: on Isla Carestia at Saltos Carestia y Gallo (5 km north of Sanariapo), alt. 100–120 m, Great Rapids of the Orinoco, Amazonas, Venezuela, November 11, 1953, *Bassett Maguire, John J. Wurdack & George S. Bunting 36171;* U. S. National Herbarium No. 2,182,157.

Pariana violascens Swallen, sp. nov.

Perennis culmis biformibus; culmi steriles 40–60 cm alti, summo 3–6 foliosi; vaginae glabrae in ore fimbriatae setis usque ad 2 cm longis; laminae 11.5–18 cm longae, 3–4 cm latae vel superiores minores, subacuminatae, ceruleo-virides, subtus granulosae; culmus fertilis 30 cm longus, adscendens, vagina suprema elongata; inflorescentia 6 cm longa, ca. 7 mm lata, pallida, spicularum fasciculis 8–9 mm longis, pedicellis spicularum mascularum 4 mm longis, basi dense pilosis; spiculae masculae: glumae acutae lemmate ca. 1/2 breviores, una lata, decurrens, 2-nervis, altera angusta, enervis, vel uterque latae, tenuiter ciliatae; lemma 4.5–5 mm longum, 1.5–1.8 mm latum, acutum, granulosum, in parte superiore reticulatum.

Leafy culms 40–60 cm high with 3–6 leaves at the summit, without a smaller blade below; sheaths glabrous, the throat fimbriate, the bristles as much as 2 cm long, but usually shorter; blades 11.5–18 cm long, 3–4 cm wide, or the upper ones smaller, rather abruptly and asymmetrically subacuminate, bluish-green, granular on the under surface; fertile culm 30 cm long, ascending; the upper sheath elongate; inflorescence 6 cm long, about 7 mm wide, pale, tinged with violet, the whorls of spikelets 8–9 mm long, the pedicels 4 mm long, not obscured by the spikelets, densely pilose at the base; staminate spikelet: glumes acute, about half as long as the lemma or somewhat shorter, one broad, decurrent, apparently 2-nerved, the other narrow, nerveless, or both glumes broad in the upper whorls, finely ciliate; lemma 4.5–5 mm long, 1.5–1.8 mm wide, acute, granular roughened, with a few transverse veins in the upper part.

TYPE: frequent, moist woodland trail, Danta Falls, Río Cuao, Río Orinoco, Amazonas, Venezuela, November 19, 1948, *Bassett Maguire & Louis Politi 27327;* U. S. National Herbarium No. 2,040,165.

Pariana pallida Swallen, sp. nov.

Perennis culmis biformibus; culmus sterilis 60 cm altus, summo ca. 10-foliosus; vaginae ca. 7 cm longae, ad summum dense pubescentes, fimbriatae setis paucis brevibus; laminae inferiores 17–18 cm longae, usque ad 4.3 cm latae, superiores minores, acuminatae, petiolo crasso 3 mm longo dense pubescenti; culmus fertilis 32 cm longus vaginis inflatis tectus; inflorescentia 6 cm longa, pallida, spicularum fasciculis ca. 8 mm longis, pedicellis spicularum mascularum 2.5 mm longis, basi pubescentibus; spiculae masculae: glumae acuminatae, latae, decurrentes, 1- vel 2-nerves, vel una angusta, 1-nervis vel enervis, glabrae vel ad basin tenuiter ciliatae; lemma 4.5–5 mm longum, 2.6–3 mm latum, oblongum vel plus minusve obovatum, acutum, minute scabrum, reticulatum.

Leafy culms 60 cm high with about ten leaves in the upper third; sheaths about 7 cm long, densely pubescent toward the summit, less so or glabrous toward the base, with a glabrous glandular area just below the throat, the throat truncate with a few short fimbriate hairs; lower blades 17–18 cm long, as much as 4.3 cm wide, smaller upward, acuminate, glabrous, with a thick pubescent petiole 3 mm long; fertile culm 32 cm long, ascending, almost completely covered by the bladeless sheaths, the uppermost inflated reaching the base of the inflorescence; inflorescence 6 cm long, pale, the whorls toward the base about 8 mm long, the pedicels of the staminate spikelets about 2.5 mm long, pubescent at the base; staminate spikelet: glumes acuminate, broad, decurrent nearly to the base of the pedicels, 1- or 2-nerved, or one of them narrow, 1-nerved or nerveless, glabrous or very finely ciliate toward the base; lemma 4.5–5 mm long, 2.6–3 mm wide, oblong or slightly obovate, broadly acute, minutely scabrous, with a few transverse veins.

TYPE: common in moist lowland woods along river, Playa Alta, Río Cunucunuma, Río Orinoco, Amazonas, Venezuela, November 6, 1950, *Bassett Maguire, R. S. Cowan & John J. Wurdack 29455;* U.S. National Herbarium No. 2,040,209.

Pariana obtusa Swallen, sp. nov.

Perennis culmis biformibus; culmi steriles 40 cm alti, summo 3-foliosi; vaginae glabrae vel summo minute pubescentes, glandulosae in ore fimbriatae setis paucis brevibus; laminae 16–19.5 cm longae, 5.2–5.8 cm latae, acuminatae, ovatae, subtus glaucissimae, granulosae; culmus fertilis 42 cm longus, adscendens, vaginis purpureis tectus; inflorescentia 8 cm longa, pallida, exserta, spicularum fasciculis 7 mm longis, pedicellis spicularum mascularum 2 mm longis; spiculae masculae: glumae 3–4 mm longae, 1- vel interdum 2-nerves, una angusta altera latior, infra medium tenuiter ciliatae; lemma 4.5–5.0 mm longum, 2.5–3 mm latum, obtusum, scaberulum, violascens.

Leafy culms 40 cm high with three leaves at the summit and another smaller one a short distance below; sheaths glabrous or minutely pubescent at the summit with glandular spots at the throat and a very few short fimbriate bristles; blades 16-19.5 cm long, 5.2-5.8 cm wide, acuminate, ovate, very glaucous on the under surface, granular along the nerves; bladeless fertile culm 42 cm long, ascending, mostly covered by the purplish sheaths; inflorescence 8 cm long, pale, exserted, the whorls 7 mm long, the pedicels 2 mm long, rather densely pilose at the base; staminate spikelet: glumes 3-4 mm long, acute, 1- or sometimes 2-nerved, only somewhat decurrent, one narrower than the other, usually finely ciliate below the middle; lemma 4.5-5.0 mm long, 2.5-3 mm wide, obtuse, scaberulous, tinged with violet; anthers 3 mm long.

TYPE: vicinity of base camp, alt. 175 m, Cerro Sipapo (Paráque), Amazonas, Venezuela, December 25, 1948, *Bassett Maguire & Louis Politi 27940;* New York Botanical Garden.

Andropogon indetonsus Sohns, sp. nov. Figure 8.

Perennis; culmi erecti, 2-3 m alti, nodi glabri; vaginae glabrae, internodiis breviores; ligula 1.8-2 mm longa, membranacea; laminae 30 cm longae vel longiores, usque ad 15 mm latae, marginibus scaberrimae, omnes glabrae vel basin supra longe papilloso-pilosae; inflorescentia usque ad 30 cm longa; racemi 2-3, 2.5-8 cm longi, recti vel leviter arcuati, dense albo-pilosi; articuli 3-5 mm longi, marginibus longe pilosi, dorso tenuiter scaberrimi; spiculae sessiles 4.5-5.5 mm longae; gluma inferior spiculam aequans, 6-nervis, sulcata, marginibus versus summam scabrae; gluma superior primam aequans, carinis superne scaberrimis; lemma sterile glumam brevior, membranaceum, enerve; lemma fertile 3-3.5 mm longum, membranaceum, bifidum; arista laxe torta, 1-1.5 cm longa, scaberrima; palea lemmati subduplo brevior, membranacea, enervis; lodiculae 2, 0.5-0.8 mm longae, membranaceae; stamina 3; antherae 2-2.2 mm longae; pedicelli 3-5 mm longi, plani, marginibus pilosi, alioqui glabri vel scaberuli; spiculae pedicellatae 3.5-5 mm longae; gluma inferior 9-nervis, marginibus superne scaberrima; gluma superior primam subaequans, membranacea, carinata, 3 (-5)-nervis, marginibus superne tenuiter ciliolata; lemma sterile glumas subaequans, 3-nerve membranceum, marginibus tenuiter ciliolatum; lemma fertile 3-3.5 mm longum, 1-nervium; lodiculae 2, 0.5 mm longae; stamina 3; antherae 2 mm longae; ovarium nullo.

Perennial, culms erect, 2-3 m tall; nodes glabrous; sheaths glabrous, shorter than the internodes; ligule 1.8-2 mm long, firm, membranaceous; blades 30 cm or more long, up to 15 mm (probably more) wide, the margins scabrous, the tip acuminate and convolute, densely long papillose-pilose at the base on the upper surface behind the ligule; inflorescence 30 cm or more long, consisting of two or three branches from each of the upper nodes, the terminal branch of each fascicle long-exserted, the spathes not inflated; other branches with inflated spathes; racemes 2-3 per peduncle, 2.5-8 cm long, mostly straight or slightly curved, densely white hairy; rachis-joints 3-5 mm long, long-pilose on the margins and occasionally on the back in definite lines, finely scaberulous over the back; spikelets paired, one sessile and one pedicellate; sessile spikelet 4.5-5.5 mm long; first glume as long as the spikelet (excluding the awn), 6-nerved, longitudinally sulcate, scabrous on the margins near the tip; second glume as long as the first, strongly keeled, scabrous on the keel toward the tip; sterile lemma about 1 mm shorter than the glumes, thin, nerveless (occasionally additional faint lateral nerves can be seen); fertile lemma 3-3.5 mm long, thin, transparent, bifid at the apex, awned from between the lobes, the lateral nerves faint

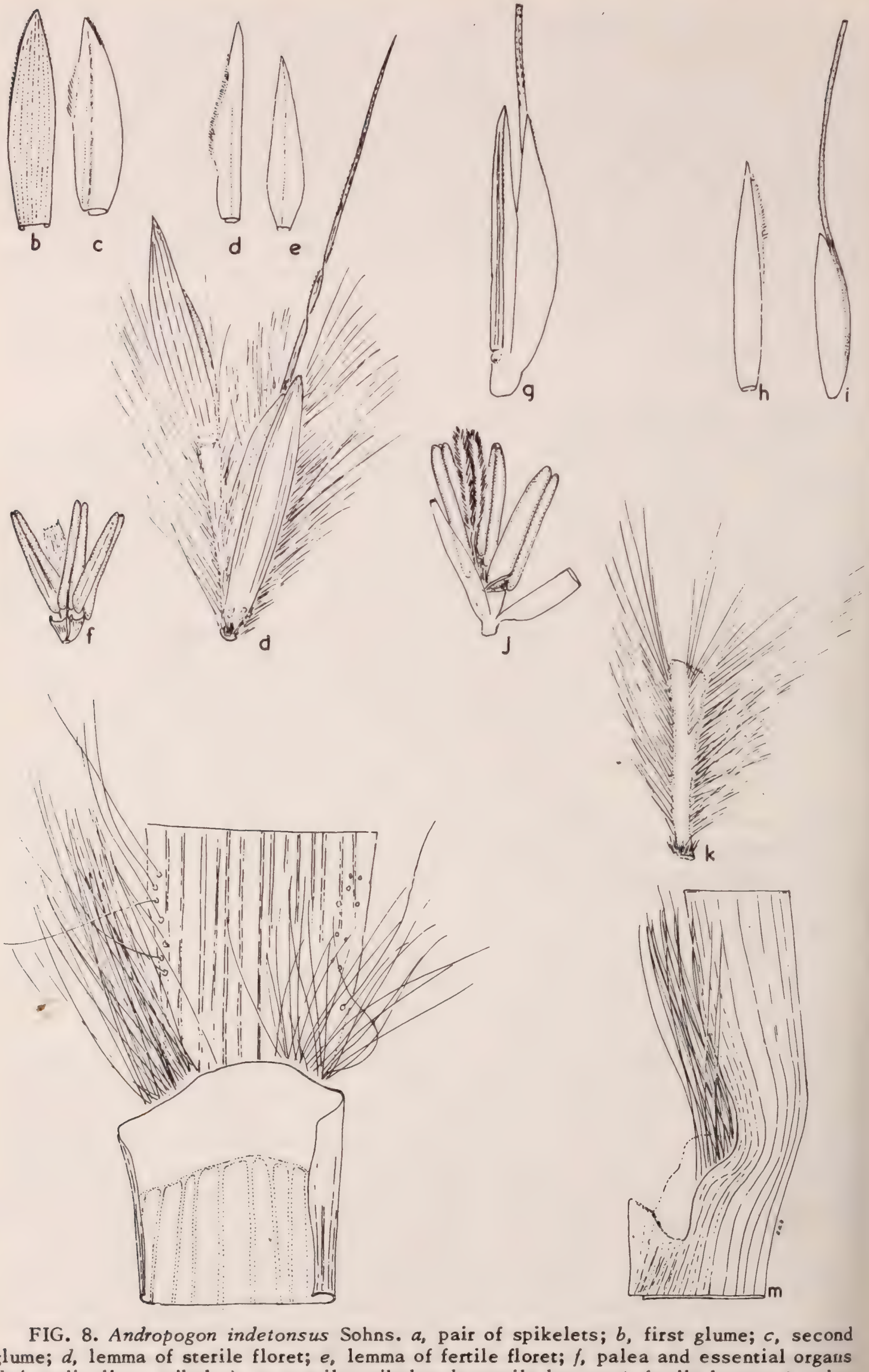

FIG. 8. *Andropogon indetonsus* Sohns. *a*, pair of spikelets; *b*, first glume; *c*, second glume; *d*, lemma of sterile floret; *e*, lemma of fertile floret; *f*, palea and essential organs (*b-f*, pedicellate spikelet); *g*, sessile spikelet; *h*, sterile lemma; *i*, fertile lemma; *j*, palea and essential organs (*g-j*, sessile spikelet); *k*, rachis-joint; *l*, ligule, sheath, and blade; *m*, side view of ligule, sheath, and blade. All × 8. Type.

or obsolete, the awn loosely twisted, 1-1.5 cm long, pale, antrorsely scabrous; palea about half as long as the lemma, a membranaceous, nerveless scale; lodicules 2, 0.5-0.8 mm long, thin; stamens 3, anthers 2-2.2 mm long; ovary developed; pedicel of the pedicellate spikelet 3-3.5 mm long, flattened, pilose on the margins, otherwise glabrous or scaberulous; pedicellate spikelet 3.5-5 mm long, prominent; first glume 9-nerved, the median nerve developed, scabrous on the margins toward the tip; second glume slightly shorter than the first, thin, keeled, 3 (-5)-nerved, the margins near the tip finely ciliolate; sterile lemma slightly shorter than the glumes, 3-nerved, thin, transparent, finely ciliolate on the margins; fertile lemma 3-3.5 mm long, 1-nerved; palea about three-fourths as long as the lemma, a nerveless scale; lodicules 2, 0.5 mm long; stamens 3, anthers mostly 2 mm long; ovary wanting.

TYPE: frequent in burnt-over area near east escarpment rim, Serra Tepequem, alt. 1000-1200 m, Terr. do Río Branco, Brazil, December 4, 1954, *Bassett Maguire & Celia K. Maguire 40148;* U.S. National Herbarium No. 2,182,180.

This species superficially resembles *Andropogon lateralis* (Spr.) Nees.

Andropogon insolitus Sohns, sp. nov. Figure 9.

Perennis, caespitosus; culmi erecti, graciles, glabri, 25-50 cm alti; vaginae compressae, valide carinatae, glabrae; ligula brevissima, circiter 1 mm longa; laminae usque ad 25 cm longae, usque ad 2.5 mm latae, omnes glabrae, marginibus scaberrimae, prope basin supra papilloso-pilosae; inflorescentia coarctata, virgata, 5-15 cm longa; articuli marginibus pilosi, dorso pubescentes; spiculae sessiles 4-4.8 mm longae (saepe 4.2 mm longae); gluma inferior 3-nervis, carinis superne scaberrima; gluma superior 3-nervis; anthoecium inferum nullum; lemma fertile membranaceum, enerve; lodiculae 2; stamina 3; antherae 0.9-1.1 mm longae; spiculae pedicellatae 3-4.7 mm longae, staminatae vel neutrae; lodiculae 2; stamina 3; antherae 1.5 mm longae; pedicelli 1.7-2.2 mm longi, marginibus pilosi.

Perennial, tufted; culms erect, glabrous, 25-50 cm tall; sheaths mostly divergent from the culm, compressed, strongly keeled, 5 or 6 vascular bundles on each side of the keel, glabrous; ligule a membranaceous rim about 1 mm long; blades mostly basal, up to 25 cm long, to 2.5 mm wide, glabrous on both surfaces, antrorsely scabrous on the margins, strongly keeled toward the base, papillose-pilose on the margins and upper surface at the base, the midrib prominent as a line of dried gelatinous matter, especially on the upper surfaces; inflorescence compact, branches aggregated; culms supporting fascicles antrorsely short-strigose below the nodes; fascicles composed of two to several short racemes, partially enclosed in the spathes; rachis-joints short-pilose on the margins, pubescent on the back, a prominent rim of hairs below the sessile spikelet; lower pair of spikelets dissimilar, one sessile, the other pedicellate; sessile spikelet one-flowered, 4-4.8 mm long (mostly 4.2 mm long); first glume strongly flattened, margins inflexed, 3-nerved, the nerves and tip slightly scabrous; second glume keeled, 3-nerved, the laterals sometimes obscure; first floret wanting; lemma a thin, membranaceous, apparently nerveless scale enclosing the palea and essential organs; lodicules 2; stamens 3, anthers 0.9-1.1 mm long; ovary well-developed; pedicellate spikelet staminate or neuter, 3-4.7 mm long; structure similar to sessile spikelet; lodicules 2; stamens 3, anthers 1.5 mm long; ovary undeveloped; pedicel 1.7-2.2 mm long, long-pilose, especially toward the tip, the hairs about 1-1.5 mm shorter than the spikelet, a prominent rim of hairs below the sessile spikelet.

TYPE: abundant in morichal 2 km south-southwest of Ciudad Piar, alt. 300 m, Estado Bolivar, Venezuela, May 2, 1955, *Bassett Maguire & John J. Wurdack 35777;* U.S. National Herbarium No. 2,116,112.

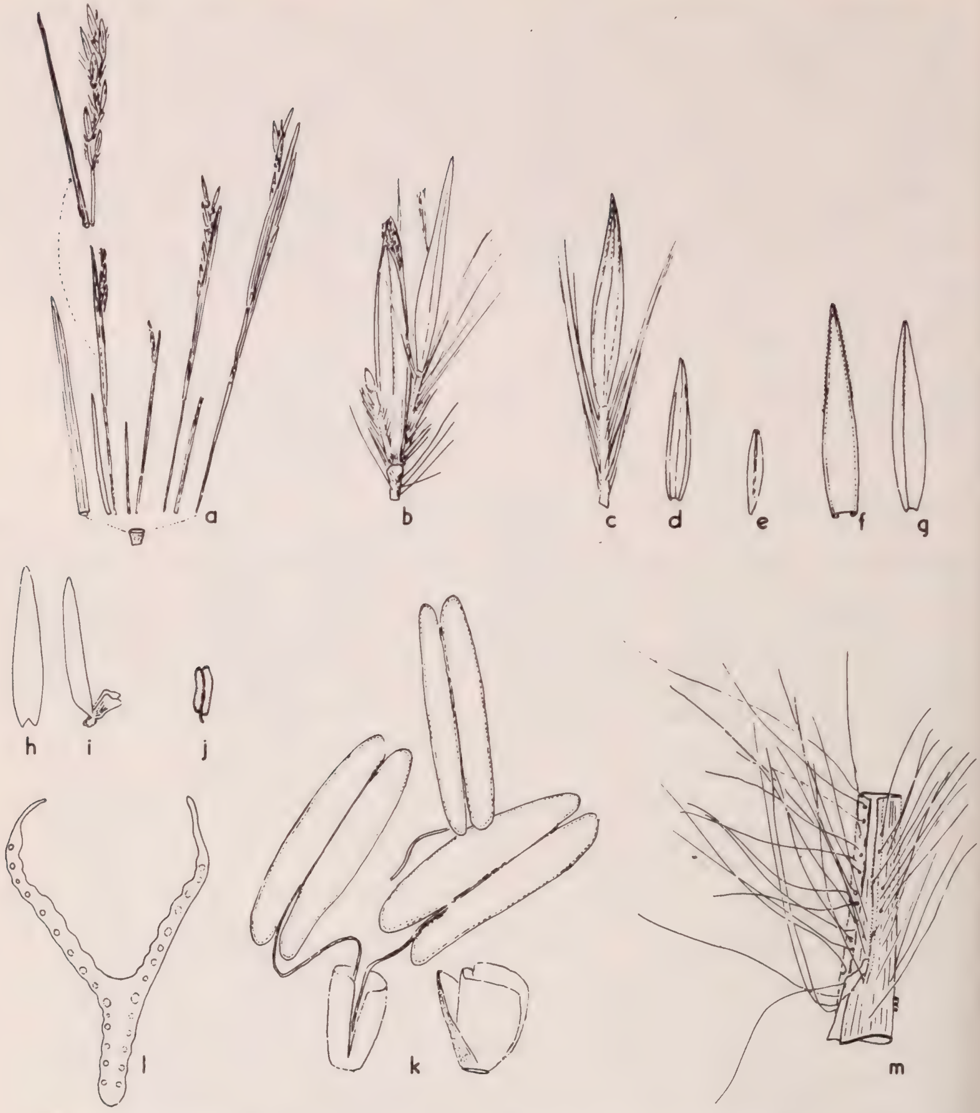

FIG. 9. *Andropogon insolitus* Sohns. *a,* cluster of branches and inflorescences, × ½; *b,* pair of spikelets; c, pedicellate spikelet; *d,* second glume; *e,* lemma; *f,* first glume; *g,* second glume; *h,* fertile lemma; *i,* palea and lodicules; *j,* anther (*f-j,* sessile spikelet); *k,* stamens, palea, and lodicules of pedicellate spikelet; *l,* cross section of sheath; *m,* junction of blade and sheath. *b-j, l-m* × 8; *k* × 20. Type.

This species resembles *A. virgatus* Desv. in appearance, but has larger spikelets and the pedicels and rachis joints are pilose.

Andropogon longiramosus Sohns, sp. nov. Figure 10.

Perennis; culmi erecti, 2 m alti vel altiores, nodi glabri; vaginae glabrae, inferiores internodiis longiores, superiores internodiis breviores; ligula membranacea, 3–4 mm longa; laminae 65 cm longae, longiattenuatae, usque ad 1.5 cm latae, omnes scaberrimae; inflorescentia 35 cm longa; pedunculi usque ad 8 cm longi, dense albo-pilosi; articuli 4–7.5 mm longi, marginibus longe pilosi, dorso scaberrimi; spiculae sessiles 4.5–5.5 mm longae, gluma inferior spiculam aequans, 6-nervis, longitudine sulcata, marginibus scaberrimo-ciliata; gluma

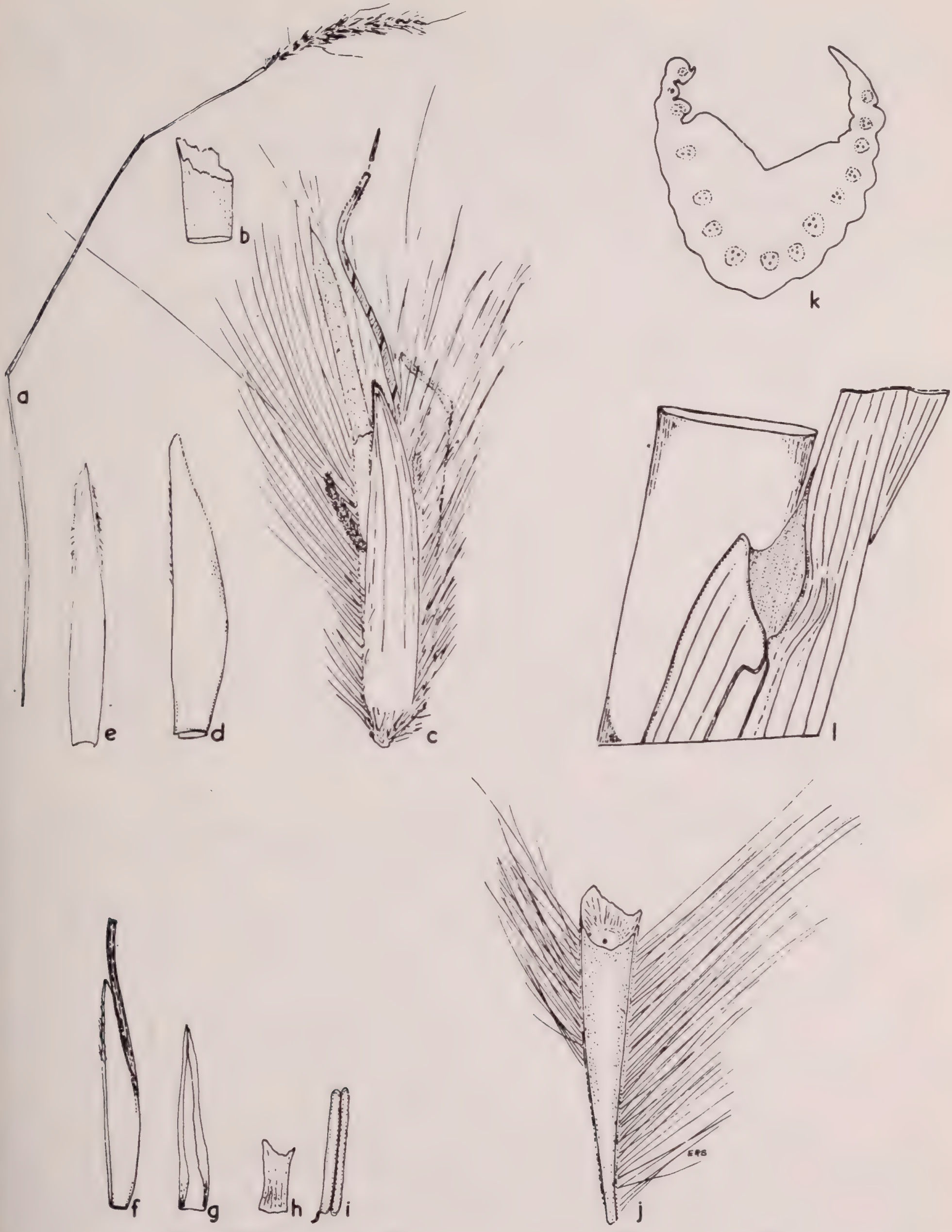

FIG. 10. *Andropogon longiramosus* Sohns. *a*, branch with terminal raceme; *b*, terminus of peduncle; *c*, pair of spikelets; *d*, second glume; *e*, sterile lemma; *f*, fertile lemma; *g*, palea; *h*, lodicule; *i*, anther; *j*, rachis-joint; *k*, cross section of blade behind the ligule; *l*, culm, ligule, junction of sheath and blade. All × 8 except *a* × ½. Type.

superior carinata, prope summam leve ciliolata, marginibus ciliolata; lemma sterile bicarinatum, glumam superiorem fere aequans; lemma fertile 3.5–4 mm longum, membranaceum, bifidum; aristae 1.5–2 cm longae, tortae; palea enervis; lodiculae 2, 0.5–0.9 mm longae; pedicelli 3.5–4 mm longi, marginibus longe pilosi; spiculae pedicellatae 2–4 mm longae, angustae; gluma inferior scaberrima, arista 0.5 mm longa vel brevior; gluma superior fere obsoleta.

Perennial; culms erect, to 2 m or more tall; nodes glabrous; sheaths glabrous, the lower longer than the internodes, the upper shorter, the margins prolonged as auricles at the collar; ligule membranaceous, firm, 3-4 mm long; blades up to 65 cm long, to 1.5 cm wide, scaberulous on both surfaces, the tip long-attenuate, the base narrowed and thickened; inflorescence 35 cm long, composed of numerous long, fascicled branches; peduncles 8 cm or more long, spreading, each enclosed by a sheath about two-thirds as long as peduncle; racemes solitary, 3-6 cm long, densely white hairy; rachis-joints 4-7.5 mm long, long-pilose on the margins, sometimes one side pilose on the upper half only, scaberulous over the back; spikelets paired, one sessile, the other pedicellate; sessile spikelet 4.5-5.5 mm long; first glume as long as the spikelet (excluding the awn), 6-nerved, longitudinally sulcate, the margins and tip scabrous-ciliate; second glume strongly keeled, the keel shortly ciliate toward the tip, finely ciliolate on the thin margins; sterile lemma 2-keeled, about as long as the second glume, the margins finely ciliolate toward the tip; fertile lemma 3.5-4 mm long, thin, transparent, bifid at the apex, awned from between the lobes; awns prominent, once-geniculate, twisted 3-5 times to the first bend, brown when dry, the terminal portion pale, antrorsely scabrous; palea a nerveless scale two-thirds as long as the lemma; lodicules 2, 0.5-0.9 mm long; stamens 3, anthers 2-2.5 mm long; ovary developed; pedicel of the pedicellate spikelet 3.5-4 mm long, long-pilose on the margins; sterile spikelet 2-4 mm long, narrow; first glume scaberulous, short-awned (0.5 mm or less); second glume reduced to a small scale.

TYPE: frequent in deciduous woodland between Campo Verada and Campo M. Perez, Caño Verada, Cerro Guanay, elev. 900-1100 m, Caño Guaviarito, Río Ventuari, Amazonas, Venezuela, Jan. 30, 1951, *Bassett Maguire, Kathleen D. Phelps, Charles B. Hitchcock & Gerald Budowski 31661;* U.S. National Herbarium No. 2,078,750.

Andropogon perdignus Sohns, sp. nov. Figure 11.

Perennis, caespitosus; culmi erecti, fere 3 m alti, glauci, nodis glabris; vaginae glabrae, internodiis breviores, interdum leviter glaucae; ligula membranacea, circiter 2 mm longa; laminae fere 45 cm longae, usque ad 15 mm latae, omnes glabrae vel supra leviter scaberrimae, subtus costa media prominula; inflorescentia 25-35 cm longa; racemi 2-4 cm longi, dense albo-pilosi; articuli ca. 3 mm longi, marginibus dense longe pilosi, dorso scaberrimi; spathae racemos aequans vel longiores; spiculae sessiles 4-5 mm longae; gluma inferior spiculam aequans, 4 (-6)-nervis, prope basin sulcata, marginibus inflexis, ciliolatis, apice scaberrima, dorso plana; gluma superior primam aequans, leviter carinata, 3-nervis, costa media breve pubescento-ciliolata; lemma sterile membranaceum, bicarinatum, marginibus ciliolatum; lemma fertile 3-3.7 mm longum, membranaceum, bifidum; arista 1.5-2 cm longa, exserta, geniculata; palea lemma fertile subaequans, membranacea, bicarinata, apice ciliolata; lodiculae 2, 0.5-0.7 mm longae; stamina 3; antherae 1.5 mm longae; pedicelli spicula sessili breviores, plani, marginibus leviter longe pilosi; spiculae pedicellatae 2.4-3 mm longae, latae; gluma prima 5-nervis (gluma secunda et lemma sterile inclusa).

Perennial; caespitose; culms erect, up to 3 m tall, glaucous; nodes glabrous; sheaths glabrous, shorter than the internodes, sometimes slightly glaucous at the base; ligule a firm membranaceous rim about 2 mm long; blades up to 45 cm long, 15 mm wide or less, glabrous on both surfaces, or slightly scaberulous on the upper surface, the midnerve prominent on the lower surface, the base of the blade narrowed and slightly thickened, the margins inrolled slightly and antrorsely scabrous; inflorescence 25-35 cm long, loosely branching; racemes 2-4 cm long, densely white-pilose and enclosed at the base by the subtending spathe; rachis-joints about 3 mm long, densely long-pilose on the margins and scaberu-

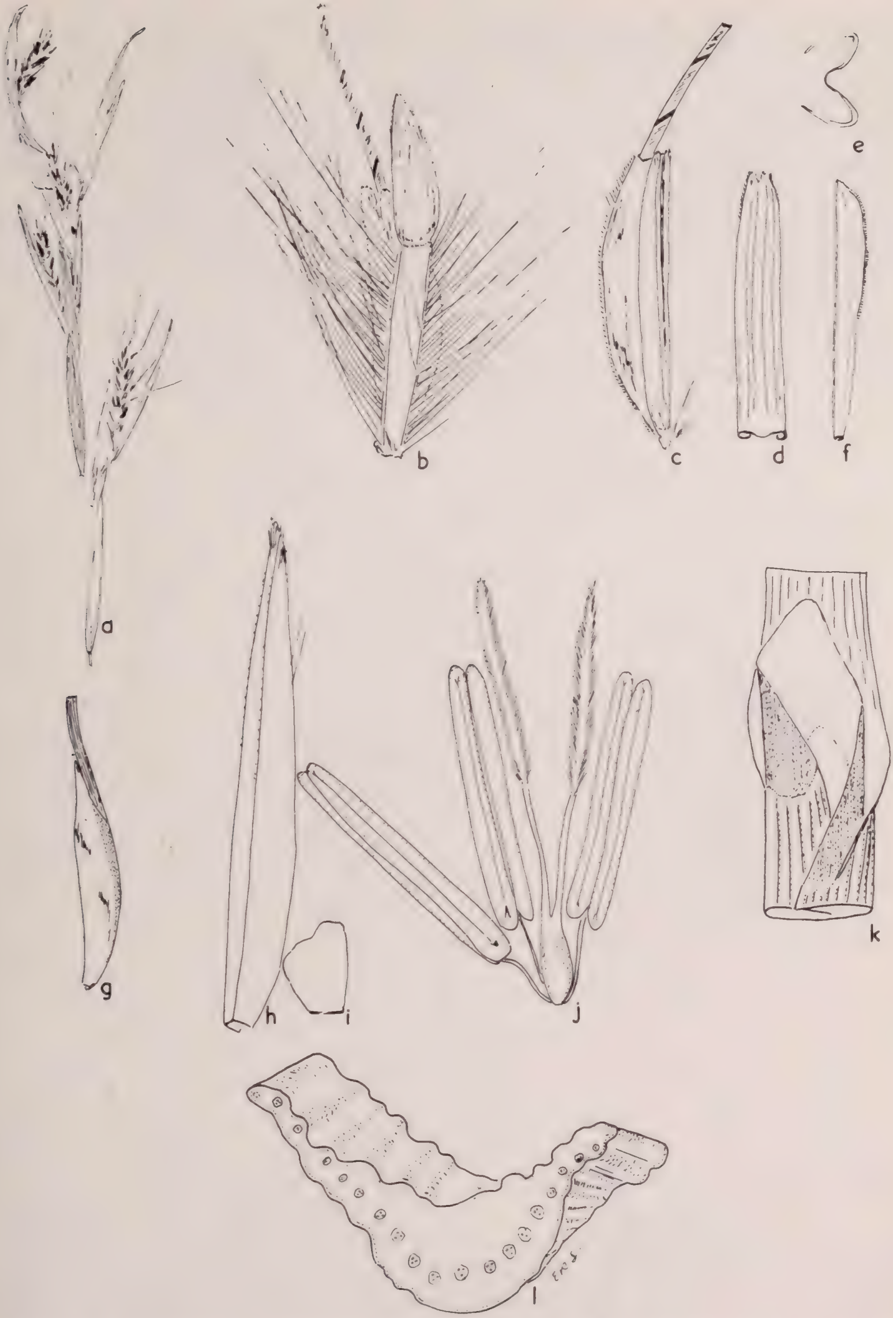

FIG. 11. *Andropogon perdignus* Sohns. *a,* branch of inflorescence, × ½; *b,* pair of spikelets; *c,* sessile spikelet; *d,* first glume; *e,* cross section of first glume; *f,* sterile lemma; *g,* fertile lemma; *h,* palea; *i,* lodicule; *j,* essential organs; *k,* ligule, junction of sheath and blade; *l,* cross section of blade behind the ligule. *b-g, k-l* × 8; *h-j* × 20. Type.

lous over the back; spathes prominent, as long as or longer than the raceme; sessile spikelet 4–5 mm long (mostly 4.5 mm long), the first glume as long as the spikelet (excluding the awn), 4-(probably 6-) nerved, deeply sulcate at the base, the margins and tip scaberulous and ciliolate, the back flat, the margins inflexed; second glume as long as the first, strongly keeled, 3-nerved, the median nerve short pubescent-ciliolate toward the tip; sterile lemma thin, 2-keeled, the margins delicately ciliolate; fertile lemma 3-3.7 mm long, thin, bifid, awned from between the lobes; awn 1.5-2 cm long, exserted, once-geniculate, the first segment brown, tightly twisted, the terminal segment pale, antrorsely scabrous; palea about 0.5 mm shorter than the lemma, thin, transparent, 2-keeled, the tip (and sometimes the margins) finely ciliolate; lodicules 2, 0.5-0.7 mm long; stamens 3, the anthers 1.5 mm or more long; ovary developed; pedicel of the pedicellate spikelet shorter than the sessile spikelet, flattened, densely long-pilose on the margins; pedicellate spikelet 2.4-3 mm long, broad; first glume (enclosing the second and sterile lemma) 5-nerved, the median nerve developed.

TYPE: bunch grass, North Escarpment, along escarpment above Culebra, alt. 1400 m, Cerro Duida, Río Cunucunuma, Amazonas, Venezuela, November 20,

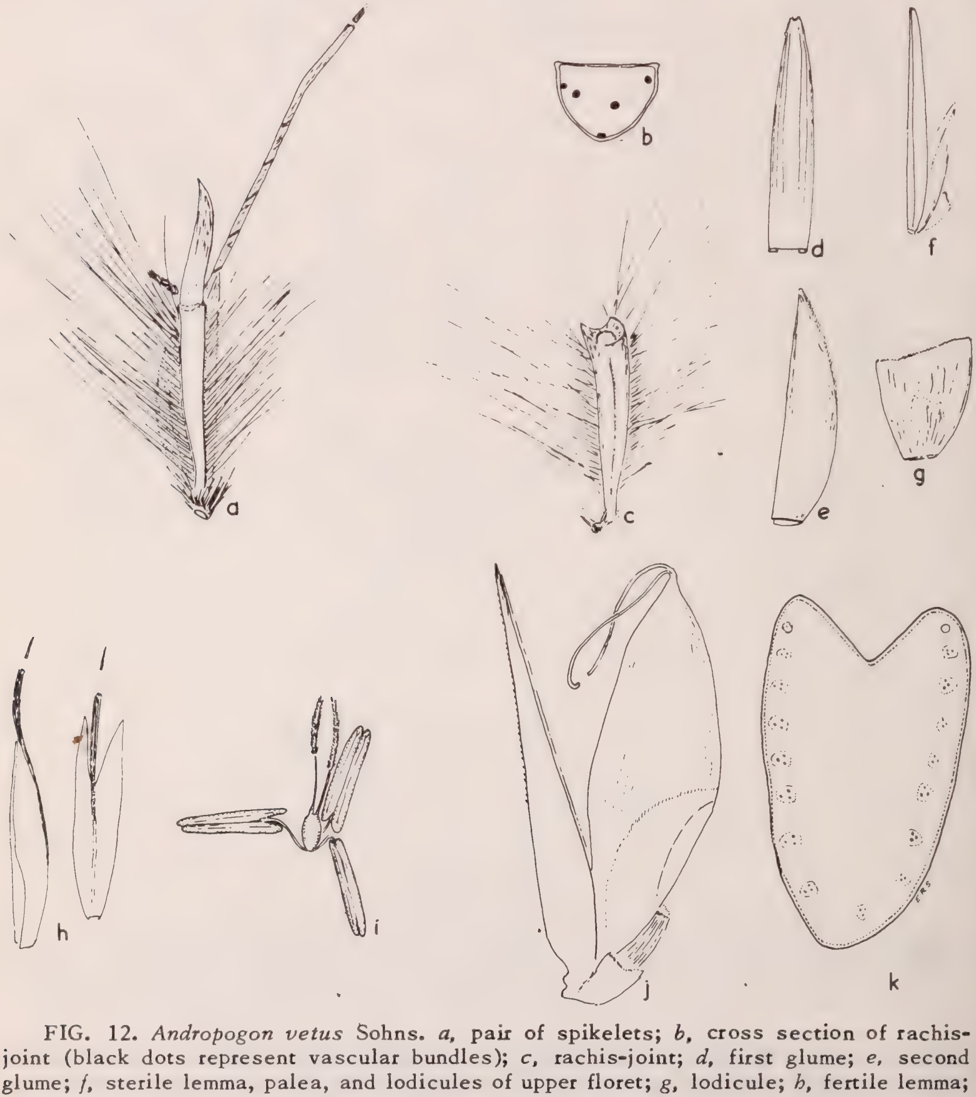

FIG. 12. *Andropogon vetus* Sohns. *a*, pair of spikelets; *b*, cross section of rachis-joint (black dots represent vascular bundles); *c*, rachis-joint; *d*, first glume; *e*, second glume; *f*, sterile lemma, palea, and lodicules of upper floret; *g*, lodicule; *h*, fertile lemma; *i*, essential organs; *j*, palea, base of lemma, lodicules, and caryopsis of upper floret; *k*, cross section of blade about 5 mm above the base. *a-i*, *k* × 8; *j* × 20. Type.

1950, *Bassett Maguire, R. S. Cowan & John J. Wurdack 29572;* U.S. National Herbarium No. 2,040,213.

Andropogon vetus Sohns, sp. nov. Figure 12.

Perennis; culmi erecti, 1-4 m alti, glabri vel glauci; vaginae crassae, glabrae, internodiis longiores; ligula membranacea, 3-5 mm longa; laminae 60 cm longae vel longiores, versus basin crassas, usque ad 1.5 cm latae vel latiores, omnes glabrae, attenuatae; racemi subcompositi in apice culmorum, elongati, solitarii, 1-3 cm longi; articuli 2-3.5 mm longi, marginibus longe pilosi; spiculae sessiles 3.7-5.3 mm longae; gluma inferior spiculam aequans, dorso plana, marginibus implicatis, glabra, versus summam scaberrima, 6-nervis; gluma superior primam subaequans, 1-3-nervis, carina versus summam scaberrima; lemma sterile membranaceum, vacuum; lemma fertile glumis circiter 1 mm brevior, apice bifidum; arista 1-2.5 cm longa, columna torta; palea lemmati subduplo brevior, carinis ciliolatis; lodiculae 2, 0.5-0.7 mm longae, truncatae; stamina 3; antherae 1.5-2 mm longae; pedicelli 3.5-3.8 mm longi, marginibus longe pilosi; spiculae pedicellatae 2.4-3.9 mm longae; anthoecia nulla (vel interdum cum lemmate sterili).

Perennial; culms erect, 1-4 m tall, glabrous (glaucous in the field); sheaths thick, glabrous, longer than the internodes, open; ligule a membranaceous rim 3-5 mm long, the margin of the sheath auriculate at the summit; blades long, thickened at the base, almost petiole-like, up to 60 cm long, to 1.5 cm wide, glabrous on both surfaces, the tip attenuate; inflorescence of numerous aggregate racemes; racemes solitary on each peduncle, 1-3 cm long, partially enclosed by the subtending spathe; rachis-joints 2-3.5 mm long, rounded on the back, flat on the adaxial side, long-pilose on the margins, the hairs 1-3 mm long, the apex cup-shaped, the rachis-joints hollow (vascular bundles were present in the internodes without surrounding parenchyma tissue); lowest pair of spikelets dissimilar, one sessile and one pedicellate; sessile spikelet 3.7-5.3 mm long spikelets toward the tip of the raceme longer); first glume as long as the spikelet, flat on the back, the margins inrolled, glabrous, scaberulous toward the tip, 6-(or more) nerved, the laterals faint or obsolete, scaberulous on the keel toward the tip; first floret represented by a 2-keeled, thin, membranaceous, empty lemma; fertile lemma about 1 mm shorter than the glumes, bifid at the apex, the membranaceous tips about 1 mm long, awned from between the lobes, the awn geniculate, 1-2.5 cm long, twisted 3-4 times to the first bend, brown, the tip about 1 cm long, pale, scaberulous; palea about half as long as the lemma, 2-keeled, ciliolate on the keels and at the tip; lodicules 2, truncate, 0.5-0.7 mm long; stamens 3, the anthers 1.5-2 mm long; pistil well-developed; pedicel 3.5-3.8 mm long, long-pilose on the margins; pedicellate spikelet 2.4-3.9 mm long (pedicellate spikelets longer toward the tip of the raceme), the first and second glumes developed (sometimes a sterile lemma present).

TYPE: locally frequent, northwest slopes, Cerro Yapacana, Río Orinoco, Terr. Amazonas, Venezuela, January 1, 1951, *Bassett Maguire, R. S. Cowan & John J. Wurdack 30519;* U.S. National Herbarium No. 2,040,240; 2-3 m high, frequent in thickets on left branch of Caño Yutaje, elev. 1200 m, Serrania Yutaje, Río Manapiare, February 25, 1953, *Bassett Maguire & Celia K. Maguire 35410.*

Trachypogon ramosus Swallen, sp. nov.

Perennis; culmi erecti robusti ca. 2 m alti, ramosi, ramis erectis nodis barbatis; vaginae, superioribus exclusis, internodiis multo longiores, glabrae, auriculatae; ligula usque ad 12 mm longa, firma, acuta vel subacuminata; laminae usque ad 27 cm longae, 5-8 mm latae, attenuatae, superiores minores reflexae; racemi 3 vel 4, adscendentes, 4-13 cm longi; spicula fertilis 8 mm longa, callo 2 mm longo dense barbato pilis ad 3 mm longis; gluma prima pilosa ad summam pilis longis; lemma sterile gluma prima brevius, tenuissimum, truncato-eroso-laceratum, marginibus ciliatis; arista ca. 2 cm longa, gracilis, obscure 2-geniculata, dense villosa; spiculae masculae 5 mm longae, conspicuosae, plus minusve purpureae, marginibus in parte superiore alis angustis hispido-ciliatis; antherae 3 mm longae.

Perennial; culms erect, rather coarse, about 2 m high, branching and rebranching, the branches erect, the visible nodes bearded with ascending hairs; sheaths, except the upper ones, much longer than the internodes, glabrous except for a few hairs at the summit, auriculate, the auricles 4-7 mm long, or shorter on the branches, acute or acuminate, coalesced with the ligule; ligule as much as 12 mm long, firm, acute or subacuminate; blades as much as 27 cm long, 5-8 mm wide, attenuate, those of the secondary branches and the upper ones smaller, the latter usually reflexed; racemes 3 or 4, ascending, 4-13 cm long, purplish; fertile spikelet 8 mm long including the callus, this 2 mm long, densely hairy, the hairs reaching to 3 mm from the tip, the scar 1 mm long, narrow, but narrowed toward both ends; first glume pilose with long hairs intermixed especially toward the summit; second glume longer than the first, sparsely covered with long hairs; sterile lemma shorter than the first glume, very thin, truncate-erose-lacerate, the margins conspicuously ciliate; awn about 2 cm long, slender, obscurely 2-geniculate, densely plumose to the tip with very fine hairs; staminate spikelets conspicuous, obscuring the fertile ones; first glume with long stiff hairs above, sparsely hairy with shorter hairs below, the margins narrowly winged in the upper half, hispid-ciliate; sterile and fertile lemmas similar, broad, thin, finely ciliate, a little shorter than the glumes; anthers 3 mm long.

TYPE: locally frequent in depression in savanna, Samwaraknatipu (Holi-tipu), alt. 1100 m, Kamarang River, Wenamu Trail, British Guiana, November 10, 1951, *Bassett Maguire & D. B. Fanshawe 32547;* U.S. National Herbarium No. 2,078,796.

The coarse branching culms and short awns finely plumose throughout are characteristic. In *Trachypogon plumosus* (Humb. & Bonpl.) Nees, the only other species recorded for British Guiana, the culms are more slender, only sparingly branching if at all, and the awns are mostly 5 cm long, the terminal segment scabrous only.

ERIOCAULACEAE[6]

Carptotepala jenmani (Gleason) Moldenke, comb. nov.

Paepalanthus jenmani Gleason, Bull. Torrey Club 56: 14. 1929.

Eriocaulon brevifolium var. proliferum Moldenke, var. nov.

Haec varietas a forma typica speciei capitulis folioso-proliferis recedit.

This variety differs from the typical form of the species in having its heads regularly leafy-proliferous in the center, the proliferations 1–2 cm. long.

Type: *Bassett Maguire & John J. Wurdack 34595;* hummocky, wet, low, open woodland Laguna at Yapacana, alt. 125 m, Alto Río Orinoco, Amazonas, Venezuela, March 20, 1953, New York Botanical Garden. The collectors note that the plant was a perennial herb, locally abundant.

Leiothrix celiae Moldenke, sp. nov.

Herba perennis ramosis; ramis crassis summitate foliosis; foliis herbaceis graminoideis acutis longe ciliatis multistriatis; pedunculis numerosissimis filiformibus brunneis obscure 4-costatis plusminusve piloso-pubescentibus, pilis antrorsis adpressis vel leviter patentibus; vaginis plerumque arcanis glabris, ore longe piloso; capitulis obconicis griseis; bracteolis involucri brunneo-stramineis lanceolatis attenuato-acutis adpresso-pilosis; receptaculo longe piloso.

Closely-branched perennial herb; branches thick, heavy, apparently at least

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[6] By H. N. Moldenke.

10 cm tall and to 2 cm thick, surmounted by a very dense crown of leaves; leaves herbaceous, rather bright-green on both surfaces, shiny, grass-like, 5–7 cm long, about 4 mm wide at the middle and 6 mm wide at the base, gradually tapering from the base to the acute apex, entire, long-ciliate with whitish hairs on the margins, the cilia spreading and conspicuous especially on younger leaves, otherwise glabrous on both surfaces, many-striate with parallel veins, not fenestrate; peduncles very numerous, filiform, light-brown, erect, 10–13 cm long, rather obscurely 4-costate, more or less pilose-pubescent with appressed or slightly spreading antrorse hairs; sheath about 1.5 cm long, usually hidden by the surrounding leaves, very closely appressed to the peduncle, brown, glabrous except at the long-pilose mouth, the blade very small, about 2 mm long, erect, closely appressed, acute or acuminate, long-ciliate; heads obconic, gray, about 5 mm wide, sometimes binary; involucral bractlets brownish-stramineous, herbaceous, lanceolate, about 1.5 mm long, 0.75 mm wide, attenuate-acute at the apex, appressed-pilose on the back; receptacle long-pilose; flowers sessile; receptacular bractlets oblanceolate, pale-stramineous or yellowish, navicular, concave, about 2.5 mm long, 0.5 mm wide, subacute at the apex, long-pilose at the base, barbate at the apex; staminate florets not seen; pistillate florets: sepals 3, separate, oblong-elliptic, about 1.7 mm long, 0.6 mm wide, subhyaline, obtuse or subacute at the apex, short-pilose on the back; petals 3, hyaline, oblong, about 1.2 mm long, 0.2 mm wide, subacute at the apex, long-pilose at the apex on the back; style slender, stramineous, about 1 mm long, glabrous, its 3 appendages borne about 0.5 mm from the base; stigmas 3, terminating the style.

Type: *Bassett & Celia K. Maguire 35314*; below the summit of Cerro Yutaje, alt. 2100 m, Serrania Yutaje, Río Manapiare, Amazonas, Venezuela, between February 17th and 19th, 1953, New York Botanical Garden. Several heads were dissected and no staminate florets discovered. Possibly the species is dioecious. The collectors note that it is "rare, one specimen only seen."

Leiothrix flavescens var. **alpina** Moldenke, var. nov.

Haec varietas a forma typica speciei recedit foliis 1.4–7 cm longis obscure puberulis vel utrinque glabris nitidisque et vaginis obscure puberulis vel glabris nitidisque.

This variety differs from the typical form of the species in having its leaves only 1.4–7 cm long, very obscurely puberulent or glabrous and shiny on both surfaces, and the sheaths very obscurely puberulent or glabrous and shiny.

TYPE: *George Henry Hamilton Tate 1109*, alt. 2200 m, Mount Auyán-tepui, Bolívar, Venezuela, New York Botanical Garden.

Paepalanthus capillaceus var. **spiralis** Moldenke, var. nov.

Haec varietas a forma typica speciei foliis regulariter spiraliterque undulatis recedit.

This variety differs from the typical form of the species in having all of its leaves regularly contorted in a spirally undulate or corkscrew fashion.

TYPE; *Bassett Maguire & D. B. Fanshawe 32292*, in rapidly running water of a river at 1250 m alt., Maipuri Falls, Karaurieng River, Imbaimadai Savannas on the Upper Mazaruni River, British Guiana, October 25, 1951, New York Botanical Garden. The collector notes that it is an abundant aquatic perennial at this locality and completely uniform in regard to leaf-character throughout the colony.

Paepalanthus fulgidus Moldenke, sp. nov.

Herba perennis; caulibus elongatis dense foliosis simplicibus erectis; foliis subcoriaceis erectis dein patentibus denique reflexis dense imbricatis subacutis utrinque parce albo-pilosis dein glabrescentibus; pedunculis stramineis 4-costatis minute pilosulis; vaginis arcte adpressis multistriatis minute albido-pilosulis, laminis longe acuminatis, margine albo-piloso; capitulis hemisphaericis albis firmis; bracteolis involucri firmis ovatis nigris longe acuminatis adpresso-pilosis ciliolatis.

Perennial herb; stems elongate to 12 cm, densely leafy, simple, erect; leaves subcoriaceous, firm, rather uniformly bright-green on both surfaces, darker in age, at first erect, later spreading, finally reflexed, densely overlapping and completely hiding the stem, 2–4 cm long, about 5 mm wide at the middle, 7 mm wide at the base, subacute at the apex, entire, scattered-pilose on both surfaces with white hairs of various lengths, less so or glabrescent and shiny in age, longitudinally parallel-veined, the 10–12 veins subprominulous and rather conspicuous beneath and usually more or less appressed-pilose on younger leaves; peduncles 3 or 4 per plant, terminal, erect, 18–30 cm long, stramineous, 4-costate, minutely pilosulous; sheaths closely appressed, about 6 cm long, many-striate, minutely pilosulous with whitish hairs, obliquely split at the apex, the blade about 8 mm long, erect, appressed, long-acuminate, white-pilosulous on the margins; heads hemispheric, 8–9 mm wide, white, firm, blooming from the periphery toward the center; involucral bractlets firm, stiff, ovate, black, about 2 mm long, 1.5 mm wide, long-acuminate at the apex, pilose with short appressed hairs on the back, ciliolate-margined; receptacle pilose; receptacular bractlets oblanceolate, dark-brown toward the apex, about 1.5 mm long, 0.5 mm wide, acute at the apex, densely white-barbate toward and at the apex on the back; staminate florets pedicellate; sepals 3, separate, oblanceolate, brown or blackish toward the apex, about 1.5 mm long, 0.5 mm wide, acute or short-acuminate at the apex, densely white-barbate toward and at the apex; petals 3, connate into a stramineous infundibular tube 0.5–1.5 mm long, glabrous, ampliate at the apex, the free portions very short, rounded at the apex; stamens 3, exserted; filaments white, about 0.5 mm long, glabrous; anthers brownish, oblong, about 0.35 mm long; pistillate florets not seen.

TYPE: *Bassett Maguire 33383a*, in wet areas on Mesa Ridge, alt. 5800–6000 ft., Ilu-tepuí, Gran Sabana, Venezuela, March 11, 1952, New York Botanical Garden. The species is said to be frequent at the type locality. Although many scores of florets were examined, no pistillate ones were found. It may be, therefore, that the species is dioecious. The central florets had very short corolla-tubes and the peripheral ones elongated corolla-tubes. This appears to be correlated with the degree of maturity of the anthers, so it would appear that the corolla-tube lengthens as the flowers mature. The remaining parts of the floret were uniform throughout the head.

Paepalanthus pendulus Moldenke, sp. nov.

Herba perennis magna ramosa pendula; caulibus usque ad 2 m longis dense foliosis; foliis subcoriaceis arcte imbricatis lanceolatis patentibus obtusiusculis utrinque glabris nitidisque obscure multistriatis; pedunculis numerosis brunneis profunde 4-sulcatis 4-costatisque glabris; vaginis brunneis glabris nitidis adpressis, laminis lanceolatis acutis interdum parce ciliolatis; capitulis hemisphaericis griseis; bracteis involucri pallide stramineis firmis ovato-triangularibus acutis vel breviter acuminatis glabris nitidis; receptaculo piloso.

Large branched perennial herb, pendulous from cliff-faces; stems to 2 m long, densely leafy; leaves subcoriaceous, closely overlapping at the base, lanceolate, divergent-spreading, 7–9 cm long, 7–10 mm wide at the middle, about 15 mm wide at the base, rather blunt at the apex, entire, glabrous and shiny on both surfaces, obscurely many-striate; peduncles numerous, about 15 per stem, stout, brownish, 18–26 cm long, rather deeply 4-sulcate and 4-costate, glabrous; sheath brownish, 7–7.5 cm long, glabrous and shiny, rather closely appressed, the blade lanceolate, erect, appressed, 5–8 mm long, acute at the apex, sometimes slightly ciliolate-margined; heads hemispheric, gray, 7-15 mm wide; involucral bractlets pale-stramineous, firm, ovate-triangular, about 2.7 mm long and wide, acute or short-acuminate at the apex, glabrous, shiny; receptacle pilose; receptacular bractlets linear-oblong, dark-brown or black toward the apex, very thin-textured, hyaline toward the margins, about 3 mm long, 1 mm wide, barbate near the apex on the back; staminate florets long-pedicellate: sepals 3, separate, oblanceolate, blackish toward the apex, hyaline toward the base, about 2.2 mm long, 0.7 mm wide, subacute at the apex, glabrous or with a few obscure hairs at the apex on the back; petals 3, connate into a slender stramineous tube about 1 mm long, free above, the free portions erect, 0.8-1 mm long, white-hyaline; stamens 3, exserted; pistillate florets: sepals 3, separate, light-stramineous, elliptic, about 2.5 mm long, 1 mm wide, erect, acute at the apex, long-pilose at the base, otherwise glabrous; petals 3, separate, light-stramineous, oblong, about 2.5 mm long, 0.5 mm wide, erect, acute at the apex, glabrous; style about 1.2 mm long, glabrous; stigmas 3; ovary globose, about 1 mm long and wide when mature, brownish, glabrous, 3-sulcate, 3-celled.

TYPE: *Bassett Maguire 33538a*, hanging from the wet face of cliffs at 7800 ft. alt., Ilu-tepuí, Gran Sabana, Venezuela, March 20 or 21, 1952, New York Botanical Garden.

Paepalanthus venustus Moldenke, sp. nov.

Herba perennis; caulibus simplicibus vel pauciramosis densissime foliosis; foliis chartaceis patentibus vel reflexis graminoideis attenuatis acutis utrinque glabris; pedunculis 1-4 pallide brunneis aliquot costatis paullo contortis, in sulcis adpresso-pilosis; vaginis gracillimis arcte adpressis multistriatis glabris, laminis acutis ciliatis; capitulis hemisphaericis; bracteolis involucri ovatis nigris acutis versus apicem sparsissime ciliolatis; receptaculo longiter piloso.

Perennial simple or sparingly branched herb; stems slender, to 20 cm long, erect or ascending, very densely leafy throughout; branches to 8 cm long, densely leafy throughout, erect or ascending; leaves quite uniform throughout, chartaceous, spreading or reflexed, uniformly dark-green and shiny on both surfaces, grass-like, 1.5-2 cm long, 2-3 mm wide at the middle, gradually attenuate from the base to the apex, acute at the apex, glabrous on both surfaces, rather obscurely parallel-veined; peduncles 1-4 per plant, 10-20 cm long, erect, pale-brownish, several-costate, slightly twisted, appressed-pilose in the sulcations; sheath very slender, closely appressed to the peduncle, 3-4 cm long, many-striate, very slightly or not at all twisted, glabrous, obliquely split at the apex, the blade erect, appressed, about 3 mm long, acute at the apex, ciliate-margined; heads hemispheric, 6-9 mm wide; involucral bractlets ovate, black, about 2.7 mm long, 1.2 mm wide, acute, very sparsely ciliolate on the margins toward the apex; receptacle long-pilose; receptacular bractlets spatulate, brownish, about 2.2 mm long, 0.6 mm wide, acute, densely white-barbellate at the apex, otherwise glabrous; staminate florets: sepals 3, separate, elliptic, concave, about 2 mm long, 0.7 mm wide, acute, densely white-barbellate at the apex; petals 3, connate into a slender stramineous tube about 1.7 mm long, glabrous, the free apical portions about 0.7 mm long; stamens 3, included or equaling the petals; pistillate florets short-pedicellate: sepals 3, separate, oblanceolate, blackish toward the apex, about 2.5 mm long, 1 mm wide, white-barbate at the apex on the back; petals 3, separate, whitish or gray, oblong, about 2.5 mm long, 0.5 mm wide, densely long-pilose especially at the base, barbate at the apex; pistil brown, about 2.5 mm long, glabrous; style stout, about 1 mm long, glabrous; style-appendages 3, about 1 mm long, inserted at about the same level as and alternate with the stigmas;

stigmas 3, about 1 mm long; ovary oblong, about 0.5 mm long, glabrous, 3-sulcate, 3-celled.

Type: *Bassett Maguire 32840*, frequent in a bog under extensive "forests" of *Stegolepis* sp. in the Big Canyon drainage along the West Escarpment 1 km west of Cumbre Camp at 1800 m alt., Cerro Guaiquinima, Río Paragua, Bolívar, Venezuela, December 30, 1951, New York Botanical Garden.

Syngonanthus cowani var. **longipedunculatus** Moldenke, var. nov.

Haec varietas a forma typica speciei pedunculis filiformibus 8–13 mm longis recedit.

This variety differs from the typical form of the species in having its filiform peduncles 8–13 mm long, surpassing the uppermost leaves.

TYPE: *Bassett Maguire, John J. Wurdack, & George S. Bunting 36290*, on a savanna 1 km west of Cacagual (Piedra Cacaguati), Vaupés, Colombia, on the Río Atabapo, alt. of 100 m, November 19, 1953, New York Botanical Garden. The collectors note that the plant was locally occasional and had white flowers.

Syngonanthus pakaraimensis Moldenke, sp. nov.

Herba acaulescens; foliis densissime rosulatis recurvatis linearibus subacutis plusminusve dense sericeo-pilosis, ad basin densissime albido- vel cinereo-tomentosis; pedunculis plerumque 3–6 aureo-stramineis 3-costatis contortis plusminusve sericeo-pilosis, pilis patentibus saepe glanduliferis, denique glabris; vaginis gracilibus densiuscule patenti-pilosis, pilis glanduliferis, laminis lanceolatis pilosulis; capitulis hemisphaericis albis griseisque; bracteolis involucri paucis albidis griseisque obovatis rotundatis glabris; receptaculo longe piloso.

Acaulescent herb; leaves very densely rosulate, recurved, linear, 1.5–3 cm long, 1.5–2 mm wide, subacute at the apex, more or less densely silky-pilose with appressed antrorse hairs, very densely whitish- or cinereous-tomentose at the base; peduncles usually 3–6 per plant, erect, golden-stramineous, 7–27 cm long, 3-costate, twisted, more or less silky-pilose with rather spreading often gland-tipped hairs or glabrous in age; sheaths slender, 1.5–3 cm long, rather densely spreading-pilose with more or less gland-tipped hairs, obliquely split at the apex, the blade erect, appressed, lanceolate, pilosulous; heads hemispheric, white or grayish, 5–7 mm wide; involucral bractlets few, whitish or gray, thin-textured, obovate, about 1.5 mm long, 1 mm wide, rounded at the apex, glabrous; receptacle long-pilose; staminate florets pedicellate, the pedicels about 0.5 mm long, long-pilose; sepals 3, subhyaline, separate, oblanceolate, about 1.7 mm long, 0.5 mm wide, subacute, glabrous; petals 3, connate into a whitish tube about 1.7 mm long; stamens 3, included; anthers white; pistillate florets sessile: sepals 3, subhyaline, separate, lanceolate, about 2.2 mm long, 0.7 mm wide, conduplicate, long-pilose on the back with scattered hairs which easily break off; petals 3, glabrous, connate at base and apex into a hyaline tube to 2 mm long; style brownish, about 0.5 mm long, glabrous, its branches 3, about 0.5 mm long, borne at the same level as the 3 longer stigmas.

TYPE: *Bassett Maguire & D. B. Fanshawe 32539*, savanna at 1100 m alt. on the Kamarang River-Wenamu Trail, Pakaraima Mountains, British Guiana, November 11, 1951, New York Botanical Garden.

Syngonanthus phelpsae var. **pilosus** Moldenke, var. nov.

Haec varietas a forma typica speciei foliis dense adpresso-pilosis recedit.

This variety differs from the typical form of the species in having the leaves densely appressed-pilose with silvery hairs.

TYPE: *Bassett Maguire, John J. Wurdack, & George S. Bunting 37308* on the west escarpment savanna 4–8 km south of Cumbre Camp, alt. of 1850–1900 m on the summit of Cerro de la Neblina, Río Yatua, Amazonas, Venezuela, January 15, 1954, New York Botanical Garden. The collectors report that the plants were abundant, forming cushions, but had only old flowers on that date.

BROMELIACEAE[7]

The relationship of the Bromeliaceae to the area of the Guayana Highland is a curiously exact one so far as present records show. All but three genera, *Lindmania, Brocchinia*, and *Navia*, are very poorly represented if at all. *Lindmania* is found in southern Mexico and Central America and in the southern Andes and has a very close relative, *Cottendorfia*, in northeastern Brazil. As yet there is no authentic record of *Lindmania* from Colombia, so that its range consists of three widely separated areas with no single species occurring in more than one area.

Further the *Lindmania* species of the Guayana Highland comprise 16 of the total 29 and are readily distinguishable from the others by the combination of firm leaves and bipinnate inflorescences. Because of its consistently superior ovary and appendaged seeds *Lindmania* appears to be more primitive than *Brocchinia* and *Navia*, and I believe that it is ancestral to them.

Brocchinia and *Navia* are nearly perfect for a definition of the Guayana Highland area. They were both discovered in 1820 by Martius at Araracoara in southeastern Colombia, which is at one end of the area, and *Navia* extends to Tafelberg in Suriname at the eastern end. Species of one or both of them have been found at nearly every point of exploration in the area, but as yet none have been discovered outside it.

Brocchinia has differentiated from *Lindmania* by the development of a largely inferior ovary and increase in overall size while retaining the bicaudate seed-appendage. Some of its species show a very wide distribution within the area.

Navia like the dodo has lost its wings and consequently tends to have much more closely endemic species than the other two genera. Most of its species, however, have retained the superior ovary of *Lindmania*. Both *Brocchinia* and *Navia* differ from the remainder of the family in their cochlear sepals, but an occasional flower with this imbrication is found in *Lindmania*.

Lindmania

(Key to the species of the Guayana Highland)

1. Scape evident; axis of the inflorescence evident.
  2. Flowering shoot over 13 cm long.
    3. Inflorescence lax, but its branches often dense.
      4. Branches of the inflorescence well developed; flowers not fasciculate.
        5. Leaf-blades serrulate throughout; sepals serrulate. 1. *L. serrulata.*
        5. Leaf-blades serrulate only near base or entire.
          6. Pedicels 10–15 mm long, subfiliform; branches laxly many-flowered. 2. *L. wurdackii.*
          6. Pedicels 2–7 mm long, stouter.
            7. Branches of the inflorescence 9–25 cm long.
              8. Scape-bracts exceeding all or all but the highest internodes.
                9. Leaf-blades vestite on at least one side.
                  10. Indument on the upper side of the leaf-blade. 3. *L. paludosa.*
                  10. Indument on the lower side of the leaf-blade.
                    11. Racemes dense; leaf-blades 40 mm wide. 4. *L. cylindrostachya.*
                    11. Racemes lax; leaf-blades 15 mm wide. 5. *L. argentea.*

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[7] By Lyman B. Smith. Illustrated by Robert J. Downs.

9. Leaf-blades completely glabrous. 6. *L. phelpsiae.*
8. Scape-bracts much shorter than all but the lowest internodes.
12. Leaf-blades serrulate toward the base; axis 5 mm in diameter; racemes dense. 7. *L. geniculata.*
12. Leaf-blades entire; axis 2.5 mm in diameter; racemes lax. *L. guianensis.*
7. Branches of the inflorescence not more than 7 cm long.
13. Leaf-blades linear-lanceolate with slightly convex sides, 33 mm wide. 8. *L. brachyphylla.*
13. Leaf-blades narrowly triangular with straight sides, 15 mm wide.
14. Primary bracts linear, short; leaves secund. 9. *L. steyermarkii.*
14. Primary bracts broadly triangular, large; leaves not secund. 10. *L. tillandsioides.*
4. Branches of the inflorescence reduced to pulvini; flowers fasciculate. 11. *L. subsimplex.*
3. Inflorescence densely cylindric.
15. Leaf-blades serrate near base, 20 mm wide; scape elongate. 12. *L. thyrsoidea.*
15. Leaf-blades entire, 10 mm wide; scape 6 cm long. 13. *L. stenophylla.*
2. Flowering shoot not more than 13 cm. long; leaves densely white-flocculose beneath; flowers erect-secund. 14. *L. minor.*
1. Scape none; inflorescence corymbose, few-flowered; leaves much shorter than the normally elongate stem. 15. *L. navioides.*

2. **Lindmania wurdackii** L. B. Smith, sp. nov. Fig. 13.

Caulescens, florifera 55 cm alta; foliis ad 45 cm longis, vaginis ellipticis, parvis, vix distinctis, laxe serratis et minutissime lepidotis, laminis linearibus, acuminatis, 14 mm latis, planis, basibus extremis exceptis glabris integrisque; scapo erecto vel adscendente, gracili, glabro; scapi bracteis strictis, subfoliaceis, magnis et internodia multo superantibus sed scapum paulo occultantibus, integris; inflorescentia laxe bipinnatim paniculata, anguste pyramidata, 36 cm longa, 17 cm lata, glabra; bracteis primariis angustissime triangularibus; ramis patentibus, sublaxe quaquaverseque multifloris, basibus sterilibus brevibus nudisque, bracteis florigeris ellipticis, vix 2 mm longis, membranaceis; pedicellis divergentibus, gracillimis, 10–15 mm longis; sepalis late ellipticis, obtusis, 3 mm longis, integris; petalis late ellipticis, obtusis, 7 mm longis, albis, stamina paulo superantibus; ovario pyramidali; stylo brevi; seminibus longe caudatis.

TYPE: infrequent on wet rocks, about base of falls, upper Caño Culebra at 1300 m alt., Cerro Duida, Río Cunucunuma, Amazonas, Venezuela, November 20, 1950, *B. Maguire, R. S. Cowan & J. J. Wurdack 29637.*

VENEZUELA: Bolívar: Chimantá Massif: terrestrial on rock ledge by river at 1895–1910 m alt., occasional, summit, along Caño Mojado, between base of upper falls and drop to escarpment, Torono-tepuí, February 23, 1955, *J. A. Steyermark & J. J. Wurdack 1098. Bonnetia* forest, northwestern part of summit of Abácapa-tepuí at 2125–2300 m alt., April 13, 1953, *J. A. Steyermark 74931.* (Larger and stouter than the type. Material very old and weathered.)

3. **Lindmania paludosa** L. B. Smith, sp. nov. Fig. 14.

E. planta vetusta imperfecte cognita, florifera metralis vel ultra; caudice plantae sterilis 1–3 dm longo; foliis multis, bulboso-rosulatis, ca. 45 cm longis; vaginis suborbicularibus, 7 cm latis, basi integerrimis, stramineis, glabris, apice

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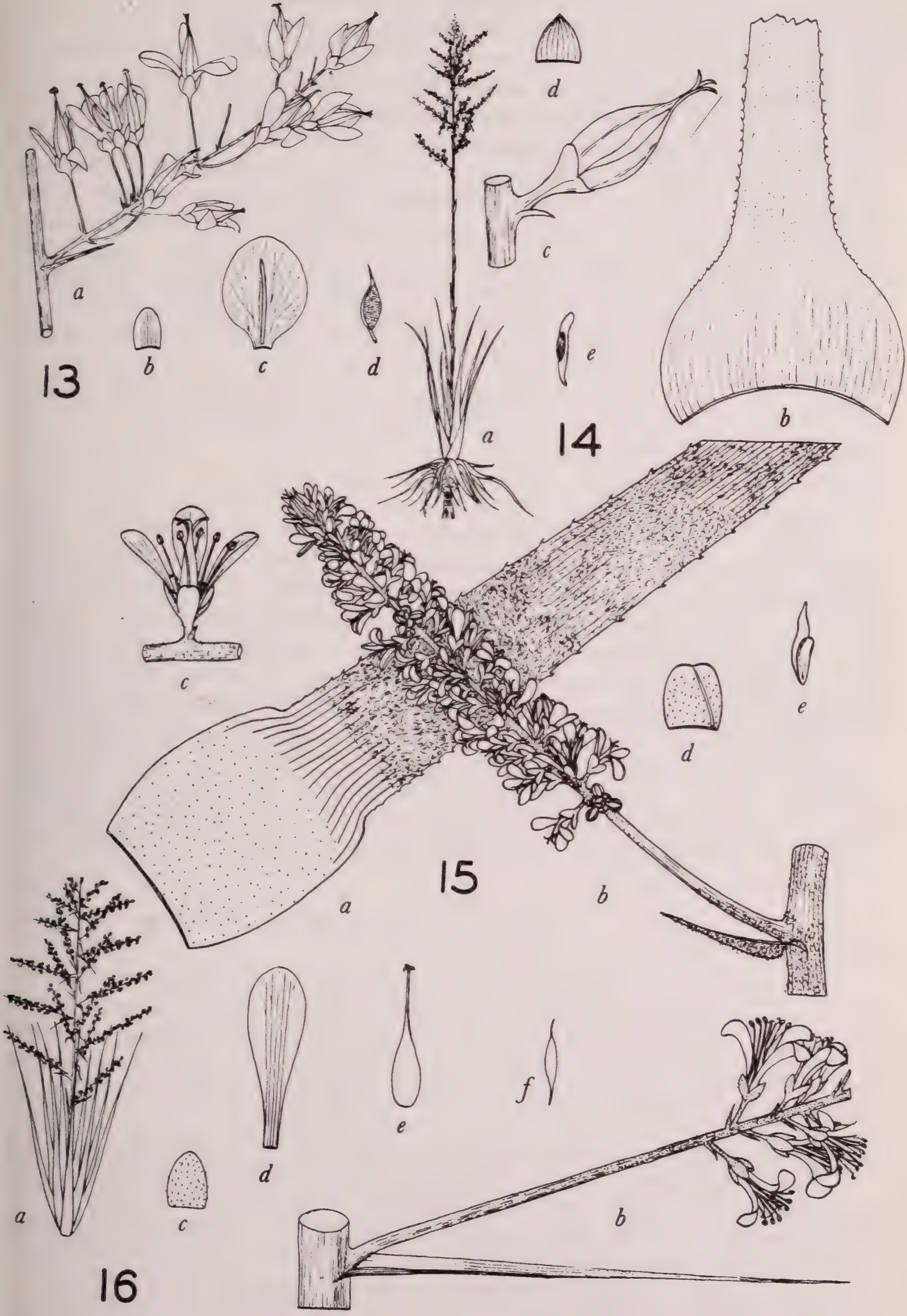
Explanation of figures 13–16

FIGS. 13–16. *Lindmania.* Fig. 13. *L. wurdackii* (*Maguire, Cowan & Wurdack 29637*). a, branch of inflorescence, × 1; b, sepal, × 2; c, petal and filament, × 2; d, seed, × 5. FIG. 14. *L. paludosa* (*Maguire 33034*). a, habit, × 1/20; b, base of leaf, × ½; c, fruit, × 2; d, sepal, × 2; e, seed, × 2. FIG. 15. *L. cylindrostachya* (*Maguire 35280*). a, base of leaf, × ½; b, branch of inflorescence, × ½; c, flower, × 1; d, sepal, × 2; e, seed, × 4. FIG. 16. *L. phelpsiae* (*Phelps & Hitchcock 501*). a, habit, × 1/20; b, base of branch, × 1; c, sepal, × 2; d, petal, × 2; e, pistil, × 2; f, seed, × 5.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dense serrulatis, brunneis et supra dense lepidotis; laminis anguste triangularibus sed apice ipse obtusis incrassatisque, 28 mm latis, supra lepidibus pallidis filamentoso-partitis dense lanatis, subtus glabris, basi spinis latis brunneis rectis vel hamatis 1 mm longis subdense serratis; scapo erecto, quam foliis subduplo longiore, ex sicco 8 mm diametro, glabro; scapi bracteis subfoliaceis sed integerrimis, erectis, supremis exceptis internodia superantibus sed angustis et scapum nullo modo obtegentibus; inflorescentia ample subtripinnatim paniculata, pyramidata, 4 dm longa, 2 dm diametro, glabro; axi fere recto; bracteis primariis eis scapi similibus sed gradatim minoribus, quam basibus sterilibus nudis ramorum duplo vel triplo brevioribus; ramis simplicibus vel paulo divisis, subdense quaquaverseque florigeris; bracteis florigeris late ovatis, pedicellos robustos 2–3 mm longos subaequantibus; floribus patentibus; sepalis late ovatis, 3.5 mm longis, integris, paucinervatis; petalis staminibusque ignotis; stylo gracili; ovario minutissime infero, placentis interno loculorum angulo lineatim affixis; seminibus caudatis.

TYPE: marsh-bog on rocky elevations in savanna near cumbre camp, 1800 m alt., Cerro Guaiquinima, Río Paragua, Bolívar, Venezuela, January 9, 1952, *B. Maguire 33034.*

4. **Lindmania cylindrostachya** L. B. Smith, sp. nov. Fig. 15.

Florigera 1 m alta; foliis 7 dm longis, vaginis late ellipticis, 6 cm longis, integris, impresso-punctatis, ex sicco stramineis, glabris, laminis angustissime triangularibus, 4 cm latis, coriaceis, supra glabris, subtus dense albo-flocculosis, ad basin versus laxe serrulatis; scapo recto, 15 mm diametro, albo-flocculoso; scapi bracteis subfoliaceis, erectis, dense imbricatis, integris; inflorescentia laxe bipinnatim paniculata pallide brunneo-flocculosa; axi recto; bracteis primariis anguste triangularibus, quam ramorum basibus sterilibus nudis applanatis ad 8 cm longis subduplo brevioribus; ramis patentibus, leviter sursum curvatis, 21 cm longis, dense florigeris; bracteis florigeris triangularibus, quam pedicellis graciliter obconicis 5 mm longis subduplo brevioribus; floribus patentibus, nullo modo secundis; sepalis late ellipticis, retusis, 5 mm longis, verruculosis, integris; petalis obtusis, 12 mm longis, stamina superantibus, pallide roseis; seminibus longe caudatis.

TYPE: terrestrial, frequent in thickets on rocky summit at 1600 m alt., main branch of Caño Yutaje, Serranía Yutaje, Río Manapiare, Amazonas, Venezuela, February 17–19, 1953, *B. & C. K. Maguire 35280.*

The combination of serrate leaves with flocculose under surface, laxly bipinnate inflorescence, straight axis, dense racemes, and non-secund flowers distinguishes *Lindmania cylindrostachya* within the genus. However, its coarse habit and roseate petals reduce some of the previous distinctions between *Lindmania* and *Connellia,* making the position of the latter precarious.

6. **Lindmania phelpsiae** L. B. Smith, sp. nov. Fig. 16.

Verisimiliter acaulis, florifera metralis; foliis 6 dm longis, vaginis ellipticis, 4 cm longis, albo-cretaceis, laminis angustissime triangularibus, longe acuminatis, 2 cm latis, glabris, basi extrema laxe minuteque serrata excepta integris; scapo erecto, quam foliis breviore; scapi bracteis subfoliaceis sed omnin integris, erectis, magnis, internodia multo superantibus; inflorescentia lax ampleque bipinnatim paniculata, 6 dm longa, lepidibus minutissimis glanduliformibus ferrugineis subdense obtecta; axi leviter flexuoso; bracteis primarii angustissime triangularibus, quam ramis multo brevioribus; ramis patentibus, a

25 cm longis, gracilibus, subdense quaquaverseque florigeris; bracteis florigeris linearibus, obtusis, pedicellos subaequantibus vel paulo superantibus, tenuibus, rubris; pedicellis patentibus, gracilibus, 3.5 mm longis; sepalis late ellipticis, obtusis, 4 mm longis, integris, tenuibus, rubescentibus; petalis spathulatis, obtusis, 12 mm longis, albis; staminibus verisimiliter petala subaequantibus sed antheris ignotis, filamentis serie secundae cum petalis breviter connatis; ovario fusiformi, stylo gracili, placentis interno loculorum angulo lineatim affixis; seminibus caudatis.

TYPE: cumbre at 2000 m alt., Cerro Parú, Río Parú, Caño Asísa, Amazonas, Venezuela, February 11, 1949, *K. D. Phelps & C. B. Hitchcock 501.*

12. **Lindmania thyrsoidea** L. B. Smith, sp. nov. Fig. 17.

Florifera 5–10 dm alta; foliis ad 32 cm longis, vaginis imperfecte cognitis, verisimiliter suborbicularibus, ca. 4 cm diametro, stramineis, lucidis, dissite obscureque lepidotis, laminis angustissime triangularibus, acuminatis, pungentibus, 2 cm latis, supra glabris, subtus densissime adpresseque argenteo-lepidotis, ad apicem versus integris, alibi spinis antrorsis vel retrorsis ad 2 mm longis laxe armatis; scapo erecto, 6 mm diametro, sulcato, lepidibus minutis linearibus albidis dense induto; scapi vaginis subfoliaceis, internodia multo superantibus sed scapum paulo occultantibus, infimis obscure serrulatis; inflorescentia bipinnata, anguste thyrsoidea, densa, 35 cm longa, 5 cm diametro, petalis exceptis lepidibus patentibus minutis linearibus albidis dense induta; bracteis primariis linearibus, ramos infimos superantibus; ramis divergentibus, 25 mm longis, fere ad basin dense florigeris, haud secundifloris; bracteis florigeris anguste triangularibus, quam pedicellis crassiusculis 3 mm longis multo brevioribus; sepalis convolutis, reniformibus, 2.5 mm longis, late convexis, integris, crasse coriaceis, laevibus, ex sicco stramineis, lucidis; petalis 7 mm longis, quam staminibus brevioribus, lamina patente, orbiculari, convexa, indurata; capsula crasse ovoidea, longe rostrata, castanea; seminibus fusiformibus, reticulato-sculpturatis, nigris, breviter bicaudatis.

TYPE: terrestrial, frequent on northwest ridge above Camp Yutaje at 1500 m alt., Serranía Yutaje, Río Manapiare, Amazonas, Venezuela, February 23,1953, *B. & C. K. Maguire 35385.*

Pitcairnia agavifolia L. B. Smith, sp. nov. Fig. 18.

E fragmentis solum cognita sed verisimiliter maxima; folia 94 cm longa, ensiformi, obscure lepidota, vagina parva, vix distincta, atro-castanea, serrulata, lamina acuminata, 9 cm lata, plana, crassa, spinis subrectis atris ad 3 mm longis subdense armata; scapo ignoto; inflorescentia forsan simplici, e fragmentis parvis et vetustis cognita; axi tereti, laeve, 5 mm diametro; bracteis florigeris e basibus solum cognitis sed sine dubio pedicellos superantibus; pedicellis validiusculis, 6 mm longis; floribus valde recurvatis; sepalis ex sicco subtriangularibus, ca. 25 mm longis, tenuibus, nervatis; petalis staminibusque ignotis; ovario ca. ½ infero; capsula sepalis superata; seminibus alatis.

TYPE: terrestrial on granite outcrop, vicinity of Intermediate Camp at 650 m alt., Cerro Sipapo (Paráque), Amazonas, Venezuela, February 6, 1949, *B. Maguire & L. Politi 28788.*

The leaf of *Pitcairnia agavifolia* is unique in the genus. All other species with such a broad leaf have very distinct petioles. The character of winged seeds is rare in the genus but predominant in this region. The reflexed flowers and semi-inferior ovary although not unique are still very rare in the genus.

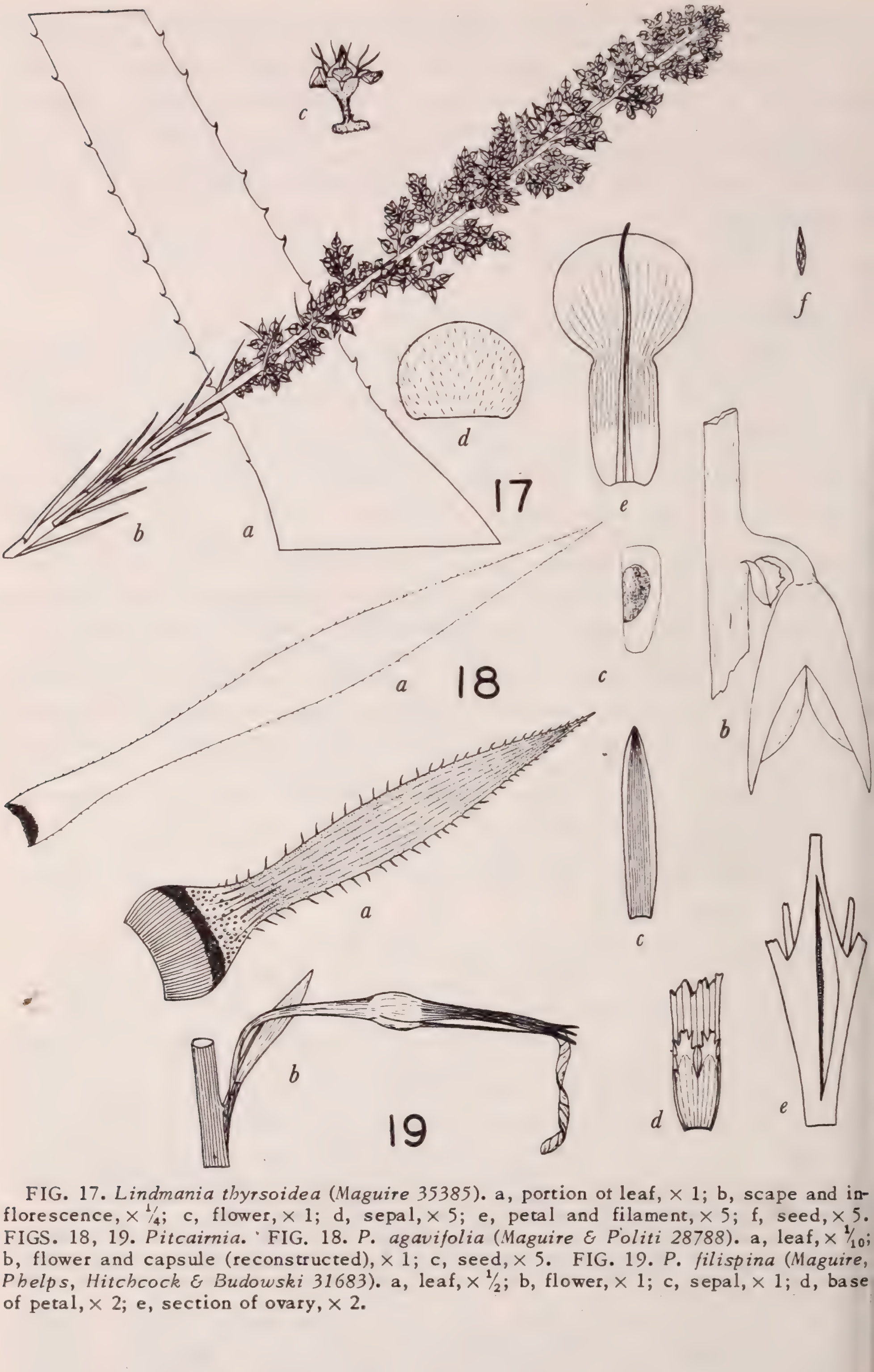


FIG. 17. *Lindmania thyrsoidea* (*Maguire 35385*). a, portion of leaf, × 1; b, scape and inflorescence, × ¼; c, flower, × 1; d, sepal, × 5; e, petal and filament, × 5; f, seed, × 5. FIGS. 18, 19. *Pitcairnia.* FIG. 18. *P. agavifolia* (*Maguire & Politi 28788*). a, leaf, × 1/10; b, flower and capsule (reconstructed), × 1; c, seed, × 5. FIG. 19. *P. filispina* (*Maguire, Phelps, Hitchcock & Budowski 31683*). a, leaf, × ½; b, flower, × 1; c, sepal, × 1; d, base of petal, × 2; e, section of ovary, × 2.

Pitcairnia filispina L. B. Smith, sp. nov. Fig. 19.

Acaulis, 8 dm alta; foliis multis, bulbose rosulatis, vaginis suborbicularibus, 3–4 cm diametro, apice castaneis et cinereo-lepidotis, alibi pallido-stramineis glabrisque, laminis lineari-lanceolatis, acuminatis, basi paulo attenuatis, 14–20 cm longis, 1–2 cm latis, planis, rigidis, supra glabris, subtus dense adpresseque cinereo-lepidotis, margine spinis gracilibus patentibus 3.5 mm longis laxe armatis; scapo erecto, 5 mm diametro, glabro, rubro; scapi bracteis strictis, late ovatis, acutis vel acuminatis, internodia subaequantibus; inflorescentia simplicissima, laxa, 27 cm longa, glabra, atro-rubra; bracteis florigeris eis scapi similibus, erectis vel paulo divergentibus, pedicellos subaequantibus; pedicellis arcuato-patentibus, 2–3 cm longis, gracilibus; sepalis anguste ellipticis, acutis, 28 mm longis ecarinatis; petalis 55 mm longis, basi ligula truncata vel bifida auctis; ovario ½ infero; ovulis alatis.

TYPE: frequent near summit in cumbre at 1800 m alt., Cerro Guanay, Caño Guaviarito, Río Manapiare, Río Ventuari, Amazonas, Venezuela, February 2, 1951, *B. Maguire, K. D. Phelps, C. B. Hitchcock & G. Budowski 31683.*

VENEZUELA: Amazonas: frequent in small savanna along left fork of Caño Yutaje at 1250 m alt., Cerro Yutaje, Serranía Yutaje, Río Manapiare, February 12, 1953, *B. & C. K. Maguire 35176.*

Probably the nearest relative of this species is *Pitcairnia ctenophylla* L. B. Smith, but that has much narrower leaf-blades which are not at all narrowed at base, small scape-bracts much shorter than the internodes, and floral bracts much shorter than the pedicels.

Pitcairnia epiphytica L. B. Smith, sp. nov. Fig. 20.

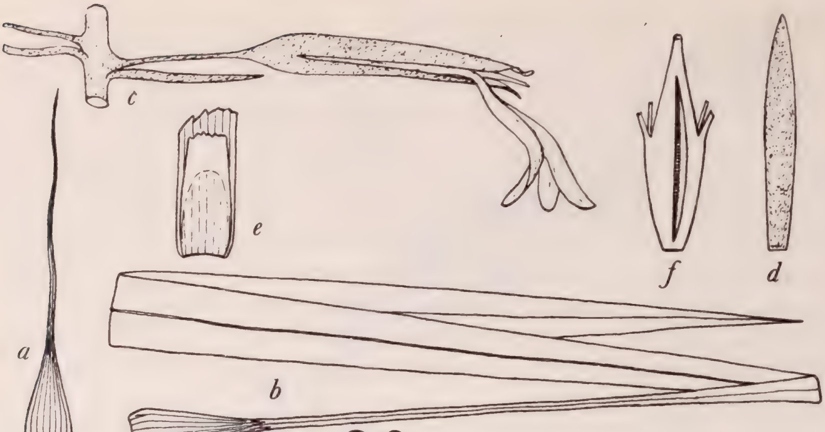
Caulescens; caule flexuoso; foliis dense imbricatis, vaginis ovatis, 4–6 cm longis, integris, atro-castaneis, dense adpresseque brunneo-lepidotis, laminis dimorphis, alteris ad flagellas parvas flexuosas gracillimas laxe serrulatas reductis, alteris longe petiolatis, lineari-lanceolatis, utrinque acuminatis, 8 dm longis, 35 mm latis, supra glabris, subtus dense adpresseque albo-lepidotis, ad apicem versus serrulatis, petiolis laxissime serratis; scapo erecto, flexuoso, albo-flocculoso; scapi bracteis internodia superantibus, lanceolatis, ad apicem versus longe acuminatis serrulatisque, viridibus; inflorescentia simplicissima, sublaxa, 4 dm long, petalis exceptis dissite albo-flocculosa; bracteis primariis infimis eis scapi similibus, floribus subaequantibus, supremis lineari-lanceolatis, pedicellos haud superantibus, tenuibus, pedicellis patentibus, gracilibus, ad 3 cm longis; sepalis lineari-lanceolatis, acutis, 30 mm longis, ecarinatis, rubris; petalis 50 mm longis, rubris, basi ligula truncata erosa auctis; ovario ca. ½ infero; ovulis alatis.

TYPE: epiphytic, along uppermost Río Yatua above mouth of Río Yacibo at 100–140 m alt., Amazonas, Venezuela, January 30–31, 1954, *B. Maguire, J. J. Wurdack & G. S. Bunting 37442.*

The only specimen of this species is too young to show the appropriate characters but it appears related to species with an indehiscent fruit such as *Pitcairnia leprieurii* Baker and *P. uaupensis* Baker. It differs from the former in its serrate scape-bracts and lower floral bracts and from the latter in its much broader leaf-blades and large lower floral bracts.

Pitcairnia kunhardtiana L. B. Smith, sp. nov. Fig. 21.

Florifera ultra 1.3 m alta; foliis 1.4 m longis, supra glabris, subtus dense adpresseque brunneo-lepidotis, subdense serrulatis, vaginis ovatis, 5 cm latis,



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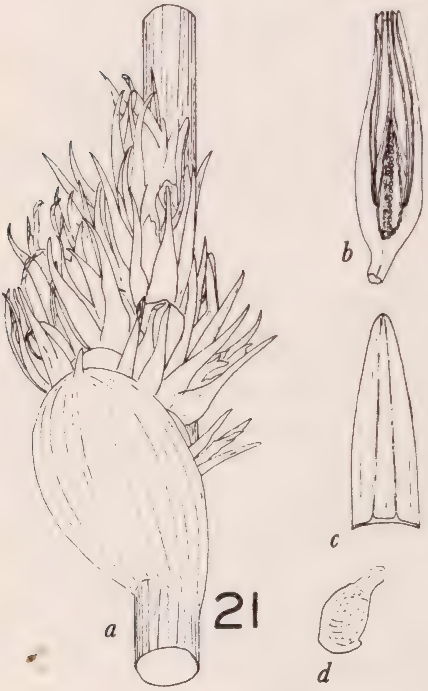

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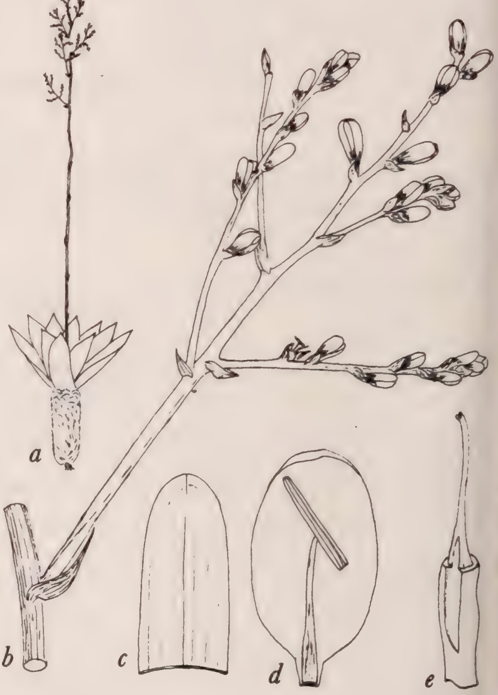

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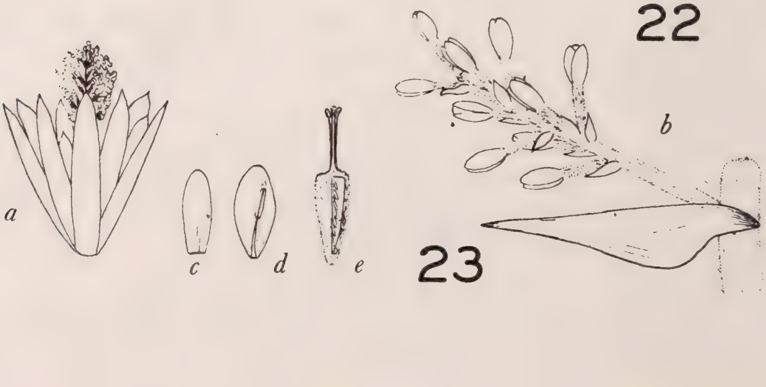

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laminis linearibus, longe acuminatis, basi paulo angustatis, 3 cm latis; scapo robusto, albo-flocculoso, mox glabro; scapi vaginis e basi late elliptica rubra in laminam foliaceam elongatam productis, supremis remotis; inflorescentia pauciramosa, 4 dm longa, rubra; bracteis primariis suborbicularibus, apiculatis, quam ramis multo brevioribus, tenuibus, fere integris, albo-lepidotis; spicis erectis, breviter pedunculatis, anguste ovoideis, dense multifloris, 5–6 cm longis, supremis congestis, alteris valde remotis; bracteis florigeris orbicularibus, quam sepalis multo brevioribus, tenuibus, albo-lepidotis; pedicellis gracilibus, 3 mm longis; floribus strictis; sepalis lanceo-oblongis, obtusis, 14 mm longis, basi bicarinatis, nervatis, glabris; petalis sepala ad 12 mm superantibus, nudis; staminibus inclusis; ovario $\frac{5}{6}$ supero; seminibus alatis.

TYPE: terrestrial, wet cliffs, lower central eastern drainage, 1650 m alt., Cerro Sipapo (Paráque), Amazonas, Venezuela, January 14, 1949, *Maguire & Politi 28368.*

There is no point in trying to place *Pitcairnia kunhardtiana* in any revision of the genus because its alate seeds and dehiscent capsule exclude all but a handful of species and its habit is quite unlike these or any other. The flowers of *P. armata* Maury from the same region are quite similar but the leaves and inflorescence are very different.

Brocchinia

1. Ovary only one-third inferior; leaves and scape-bracts serrate. Colombia: Vaupés. *B. serrata.*
1. Ovary wholly or almost wholly inferior; leaves and bracts always entire.
  2. Leaves even above, 14–30 cm long.
    3. Inflorescence glabrous or subglabrous; petals unguiculate. 1. *B. maguirei.*
    3. Inflorescence lepidote; petals not unguiculate.
      4. Leaf-blades narrowly triangular; upper scape-bracts shorter than the internodes; sepals cucullate; inflorescence tripinnate. Venezuela: Duida. *B. vestita.*
      4. Leaf-blades ligulate; scape-bracts all much exceeding the internodes.
        5. Inflorescence tripinnate; sepals and petals obtuse. 2. *B. hitchcockii.*
        5. Inflorescence bipinnate; sepals and petals acute. 3. *B. cowanii.*
  2. Leaves prominently nerved on both sides, 20–120 cm long.
    6. Inflorescence glabrous.
      7. Leaves narrowly triangular, acuminate, 40–80 cm long, 2–3 cm wide.
        8. Leaf-sheaths prominent, 20–25 cm long, dark castaneous; ultimate branches short, densely flowered. Venezuela: Auyan-tepuí, Ptari-tepuí. *B. acuminata.*
        8. Leaf-sheaths inconspicuous, 5–8 cm long; ultimate branches elongate, laxly flowered.
          9. Leaf-blades, scape-bracts, and primary bracts uniform; leaf-sheaths green; inflorescence bipinnate; capsules sharply 3-angled. Venezuela: Duida. *B. prismatica.*
          9. Leaf-blades, scape-bracts, and primary bracts with dark castaneous, indurate, involute apices; leaf-sheaths dark castaneous; inflorescence tripinnate; capsules with subterete carpels. Venezuela: Duida, Río Cunucunuma, Río Ventuari. *B. melanacra.*

Explanation of figures 20-23

FIGS. 20, 21. *Pitcairnia.* FIG. 20. *P. epiphytica* (*Maguire, Wurdack & Bunting 37442*). a, reduced leaf, × $\frac{1}{4}$; b, normal leaf, × $\frac{1}{4}$; c, flower, × 1; d, sepal, × 1; e, base of petal, × 2; f, section of ovary, × 2. FIG. 21. *P. kunhardtiana* (*Maguire & Politi 28368*). a, lower branch of inflorescence, × 1; b, longitudinal section of flower, × 2; c, sepal, × 2; d, ovule, × 25. FIGS. 22, 23. *Brocchinia.* FIG. 22, *B. maguirei* (*Maguire & Politi 28301*). a, habit, × $\frac{1}{20}$ b, branch of inflorescence, × 1; c, sepal, × 5; d, petal and stamen, × 5; e, pistil, × 5. FIG. 23. *B. hitchcockii* (*Phelps & Hitchcock 522*). a, habit, × $\frac{1}{10}$; b, branch of inflorescence, × 1; c, sepal, × 2; d, petal and stamen, × 2; e, pistil, × 2.

7. Leaves ligulate, rounded and apiculate, 80–120 cm long, 12–20 cm wide. British Guiana. *B. micrantha.*
6. Inflorescence lepidote.
  10. Ovary and capsule ellipsoid, rounded at the base, sessile. Venezuela: Ptari-tepuí, Caroni. *B. steyermarkii.*
  10. Ovary and capsule slenderly clavate, long-attenuate at the base, slenderly pedicellate.
    11. Branches strict, the lowest with the basal flowers covered by the large primary bracts; inflorescence very narrow. 4. *B. cryptantha.*
    11. Branches divergent or spreading, their sterile bases usually much exceeding the small primary bracts; inflorescence broad.
      12. Central and secondary axes straight or the flowers secund.
        13. Scales appressed, merely erose, suborbicular; sepals cucullate; petals unguiculate. Colombia, Venezuela. *B. paniculata.*
        13. Scales spreading, lacerate; sepals straight.
          14. Floral bracts lanceolate; acuminate, 5 mm long; sepals and petals similar; leaves rounded and apiculate; flowers mostly not secund. Venezuela. *B. tatei.*
          14. Floral bracts ovate, acute, 2–3.5 mm long; sepals narrow; petals broad and unguiculate; leaves acuminate; flowers strongly secund. Venezuela; Ptari-tepuí. *B. secunda.*
      12. Central and secondary axes flexuous or geniculate; flowers not secund.
        15. Scape about 3 mm in diameter, its upper bracts 1–2 cm long, remote; inflorescence rarely more than bipinnate; leaves few, erect. Venezuela, British Guiana. *B. reducta.*
        15. Scape much stouter, with larger bracts; inflorescence distinctly tripinnate; leaves many, spreading. Venezuela, Colombia. *B. hechtioides.*

1. **Brocchinia maguirei** L. B. Smith, sp. nov. Fig. 22.

Florifera metralis vel paulo ultra; caule erecto, robusto, 8–15 cm alto, basibus vetustis atris foliorum dense vestito; foliis apice caulis rosulatis, 2–3 dm longis, obscure dissiteque lepidotis, vaginis ellipticis, 6–9 cm longis, quam laminis vix latioribus, basi extrema excepta viridibus, laminis ligulatis, acutis et subulato-incrassatis, 3–6 cm latis, ex sicco crasse coriaceis et pallide viridibus; scapo erecto, gracili, glabro; scapi bracteis erectis, remotis, ex ovato in apicem subulatum acuminatis; inflorescentia angusta, laxe tripinnatim paniculata, 3–4 dm longa, fere glabra; bracteis primariis eis scapi similibus, quam basibus sterilibus nudis ramorum multo brevioribus; ramis divergentibus, gracilibus; spicis laxe paucifloris; bracteis florigeris late ovatis, acutis, 3 mm longis; floribus divergentibus, brevissime pedicellatis; sepalis oblongis, obtusis, 5 mm longis; petalis 6 mm longis, unguiculatis, laminis ellipticis, obtusis, albis; staminibus inclusis, filamentis cum sepalis petalisque brevissime connatis; ovario perjuvenili solum cognito, paulo supero; stylis coalitis.

TYPE: terrestrial, flowers white, common in marshy places in savanna, Caño Negro, 1500 m alt., Cerro Sipapo (Paráque), Amazonas, Venezuela, January 12, 1949, *B. Maguire & L. Politi 28301.*

The species is also represented by number *28300-A*, a small specimen with the same data as the type and by *27817* from Southeast Ridge and savanna terraces, 1800 m alt., and *27950*, frequent in marshy savanna, Lower Caño Negro, 1400 m alt. A very old specimen which is apparently a small narrow-leaved form of the species, is *B. Maguire, J. J. Wurdack* and *G. S. Bunting 37242*, from the summit of Cerro de la Neblina at 1700–2000 m alt., Río Yatua, Amazonas, Venezuela.

2. **Brocchinia hitchcockii** L. B. Smith, sp. nov. Fig. 23.

Epiphyta, verisimiliter acaulis, florifera ca 3 dm alta; foliis suberectis, 2 dm longis, integerrimis, subtus albo-cretaceis, vaginis haud distinctis, supra plus minusve albo-cretaceis; laminis ligulatis, planis, late acutis et apice valde cus-

pidatis, 4 cm latis, supra glabris; scapo brevi, foliis occulto; scapi bracteis strictis, dense imbricatis, lanceolatis, parvis sed subfoliaceis; inflorescentia dense tripinnatim paniculata, ellipsoidea, 13 cm longa, 8 cm diametro; axibus lepidibus angustissimis albidis dense vestitis; bracteis primariis e late ovatis acuminatis, pungentibus, crassis, quam ramis axillaribus subduplo brevioribus, extus albo-cretaceis; ramis simplicibus vel 2–3-furcatis, dense florigeris; bracteis florigeris ellipticis, acutis, ovarium subaequantibus, membranaceis, albis, glabris; floribus divergentibus, subsessilibus; sepalis ellipticis, obtusis, 5 mm longis, albis, tenuibus, basi sparse villoso-lepidotis; petalis ellipticis, obtusis, sepala paulo superantibus, albis, glabris; staminibus inclusis, paulo inaequalibus; ovario clavato, 5 mm longo, minime supero, dense villoso-lepidoto, stylis distinctis, gracilibus.

TYPE: on tree in *Bonnetia* forest in cumbre, 2000 m alt., Cerro Parú, Río Ventuari, Río Parú, Caño Asísa, Amazonas, Venezuela, February 11, 1949, *K. D. Phelps & C. B. Hitchcock 522.*

3. **Brocchinia cowanii** L. B. Smith, sp. nov. Fig. 24.

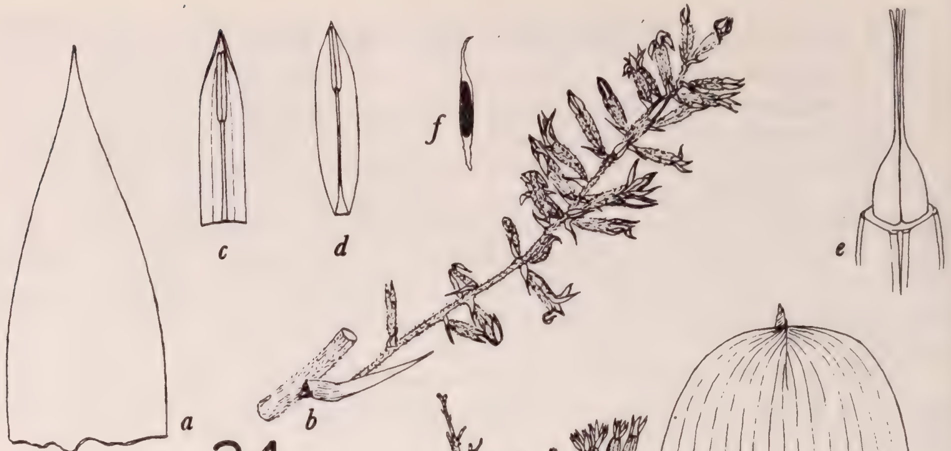
Florifera 4 dm alta; foliis multis, verisimiliter rosulatis, 14 cm longis, subtus dissite obscureque lepidotis, vaginis ellipticis, quam laminis vix latioribus, laminis ligulatis, acutis, apice subulato-incrassatis, 23 mm latis, supra laevibus sublucidisque; scapo ascendente, gracili; scapi bracteis erectis, internodia multo superantibus sed scapum paulo obtegentibus, e late ovato in apicem subulatum acuminatis; inflorescentia subdense bipinnata, angusta, 22 cm longa, squamis piliformibus minutis brunneis subdense obtecta; bracteis primariis eis scapi similibus, bases steriles breves ramorum paulo superantibus; ramis divergentibus, subdense florigeris, 6 cm longis, rhachi gracili, fere recta; bracteis florigeris e base late ovata brevissima in apicem triangularem attenuatis, ovarium dimidio aequantibus, albis; pedicellis brevissimis; floribus patentibus; sepalis oblongis, acutis, 6 mm longis, petala staminaque aequantibus, albis; petalis ellipticis, acutis, albis; staminibus liberis; ovario paulo supero; stylis liberis; seminibus longe caudatis.

TYPE: flowers white, frequent in cumbre at 1250 m elev., Cerro Moriche, Río Ventuari, Amazonas, Venezuela, January 15, 1951, *B. Maguire, R. S. Cowan & J. J. Wurdack 30924.*

4. **Brocchinia cryptantha** L. B. Smith, sp. nov. Fig. 25.

Florifera metralis vel paulo ultra; foliis rosulatis, 5–6 dm longis, dissite minuteque lepidotis, glaucis, vaginis ellipticis, amplis, atro-castaneis, laminis ligulatis, late rotundatis et cuspidato-apiculatis, 8 cm latis, reticulatis; scapo erecto, brevi, foliis omnino occulto; inflorescentia elongata, angustissima, tripinnata, pallido-flocculosa, axi flexuosa; bracteis primariis strictis et axin involventibus, suborbicularibus, apiculatis, infimis 5 cm longis et flores basales ramorum superantibus; ramis strictis, pauciramosis vel supremis simplicibus, subdensifloris, ad 10 cm longis; bracteis florigeris e late ovato acuminatis, 3 mm longis, scariosis, nervatis; pedicellis gracilibus, bracteas aequantibus vel superantibus; floribus divergentibus; sepalis oblongis, acutis, 5 mm longis, nervatis; petalis ellipticis, sepala paulo superantibus, albis; staminibus inclusis, valde inaequalibus, filamentis cum sepalis petalisque tubum brevissimum formantibus; ovario graciliter fusiforme, tereti, omnino infero; stylis dimidio coalitis; seminibus longe caudatis.

TYPE: leaves glaucous, flowers white, frequent terrestrial in broken Cumbre at 1200 m alt., Cerro Yapacana, Río Orinoco, Amazonas, Venezuela, January 3, 1951, *B. Maguire, R. S. Cowan & J. J. Wurdack 30709.*



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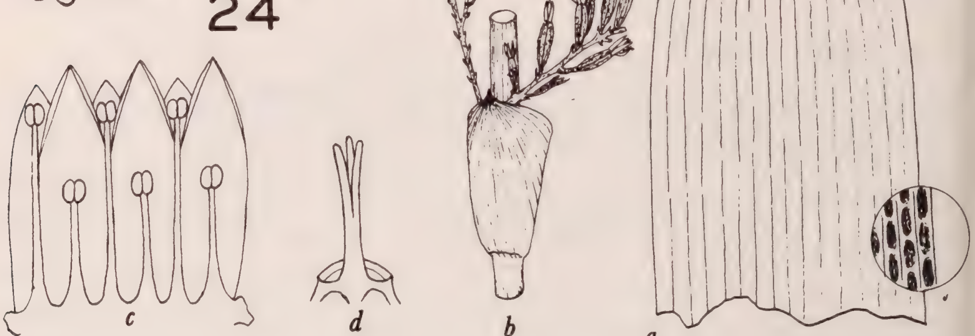

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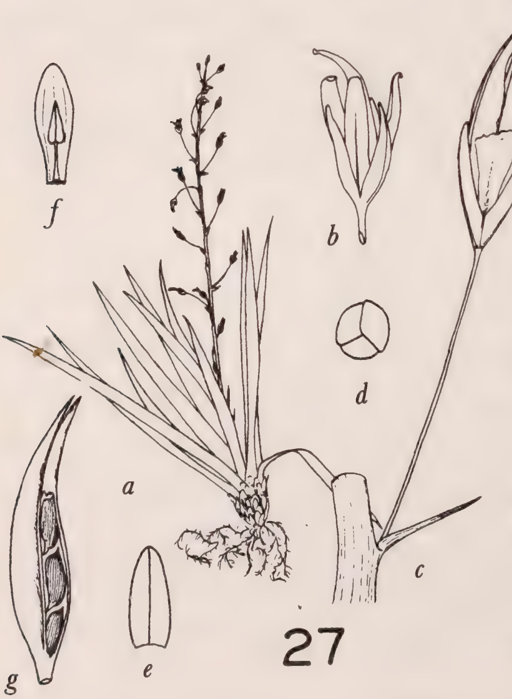

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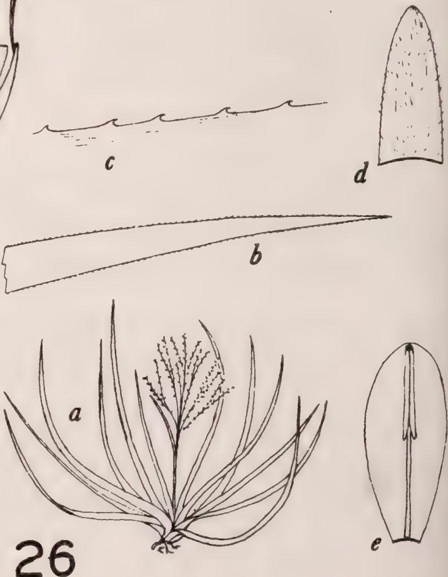


26

Navia

1. Inflorescence laxly racemose or paniculate.

2. Flowering shoot less than 3 dm high.

3. Inflorescence compound, much shorter than the 34-cm-long leaves. 1. *N. lindmanioides.*

3. Inflorescence simple, exceeding the 13-cm-long leaves. 2. *N. fluviatilis.*

2. Flowering shoot 8–50 dm high.

4. Ovary wholly superior; flowers and branches divergent to spreading.

5. Spikes densely strobilate, 7 cm long including the sterile base. 3. *N. hohenbergioides.*

5. Spikes not strobilate, to 26 cm long; flowers spreading, not contiguous.

6. Sepals 2–3.5 mm long.

7. Plant 5 m high; posterior sepals carinate. 4. *N. brocchinioides.*

7. Plant not much if any over 1 m high; sepals ecarinate. Colombia: Caquetá. *N. garcia-barrigae.*

6. Sepals 10 mm long, the posterior ones alate-carinate. 5. *N. hechtioides.*

4. Ovary ⅓ inferior; flowers reflexed; ultimate branches pendent. Colombia: Vaupes. *N. reflexa.*

1. Inflorescence glomerate or moniliform-glomerate.

8. Inflorescence elongate, moniliform from several heads. Colombia: Araracoara. *N. caulescens.*

8. Inflorescence simple, glomerate from a single head, or several digitately arranged spikes.

9. Ovary superior.

10. Sepals free.

11. Sepals 50 mm long; petals rose-purple in the typical variety; leaves entire, 23 mm wide. Eastern Colombia, Amazonian Brazil. *N. lopezii.*

11. Sepals not more than 30 mm long; petals white or yellow so far as known; leaves mostly serrulate.

12. Sepals acute or acuminate, sometimes incurved but never cucullate.

13. Sepals 22–30 mm long; petals yellow, showy; floral bracts entire or obscurely serrulate. 6. *N. wurdackii.*

13. Sepals less than 22 mm long.

14. Floral bracts serrulate or denticulate.

15. Axils of the leaf-spines conspicuously and persistently barbellate; floral bracts strongly serrate, red; sepals acuminate; inflorescence broadly hemispheric, 3–4 cm in diameter.

16. Sepals appressed-lepidote; leaf-blades 30 mm wide. 7. *N. stenodonta.*

16. Sepals sparsely tomentose with linear white trichomes; leaf-blades 6 mm wide. 8. *N. trichodonta.*

15. Axils of the leaf-spines not much more tomentose than the remainder of the blade.

17. Leaf-blades 8–15 mm wide; inflorescence not obviously scapose.

18. Sepals 8 mm long; floral bracts recurving; inflorescence green. 9. *N. viridis.*

18. Sepals 12–18 mm long; floral bracts straight.

19. Inflorescence 15 mm in diameter, green. Venezuela: Duida. *N. steyermarkii.*

19. Inflorescence 40–50 mm in diameter, pink to red. 10. *N. phelpsiae.*

Explanation of figures 24–27

FIGS. 24, 25. *Brocchinia.* FIG. 24. *B. cowanii* (*Maguire, Cowan & Wurdack 30924*). a, apex of leaf, × 1; b, branch of inflorescence, × 1; c, sepal and stamen, × 5; d, petal and stamen × 5; e, apex of ovary, × 5; f, seed, × 5. FIG. 25. *B. cryptantha* (*Maguire, Cowan & Wurdack 30709*). a, apex of leaf, × ½; b, part of inflorescence, × ½; c, perianth and androecium, × 5; d, apical part of ovary, × 5. FIGS. 26, 27. *Navia.* FIG. 26. *N. lindmanioides* (*Maguire, Cowan & Wurdack 30650*). a, habit, × $\frac{1}{10}$; b, apex of leaf, × ½; c, margin of leaf, × 5; d, sepal, × 5; e, petal and stamen, × 5; f, pistil × 5. FIG. 27. *N. fluviatilis* (*Maguire & Fanshawe 32360*). a, habit, × ½; b, flower, × 5; c, fruit, × 5; d, apical view of flower-bud, × 5; e, sepal, × 5; f, petal and stamen, × 5; g, capsule, × 5.

17. Leaf-blades not more than 6 mm wide; petals yellow.

20. Inflorescence raised above the leaf-sheaths on an evident scape; petals slightly exceeding the sepals. 11. *N. serrulata.*

20. Inflorescence sessile; petals about twice as long as the sepals. *N. aurea.*

14. Floral bracts entire or subentire.

21. Leaf-blades 8–18 mm wide.

22. Leaf-blades serrulate.

23. Inner leaf-blades basally white or rose at anthesis; larger leaf-spines acicular. 12. *N. colorata.*

23. Inner leaf-blades wholly green like the others; leaf-spines all small, low, and broad.

24. Inflorescence conspicuously involucrate with broad, erect outer bracts; petals yellow; sepals 14 mm long; leaves white-flocculose above. 13. *N. involucrata.*

24. Inflorescence not conspicuously involucrate, its outer bracts narrow; petals white so far as known; sepals 5–19 mm long; leaves glabrous or subglabrous above.

25. Sepals 5–8 mm long; inflorescence digitate-globose from several ellipsoid spikes, many-flowered. Venezuela, Amazonian Brazil. *N. crispa.*

25. Sepals 14–19 mm long; inflorescence few-flowered, simple.

26. Leaf-blades narrowly triangular, not at all narrowed at base, 7 cm long, 9 mm wide. Venezuela: Duida. *N. glauca.*

26. Leaf-blades linear, to 37 cm long and 16 mm wide.

27. Leaf-blades sparsely tomentulose; floral bracts acuminate, pungent. British Guiana. *N. angustifolia.*

27. Leaf-blades densely cinereous-lepidote beneath; floral bracts elliptic, membranaceous. 14. *N. nubicola.*

22. Leaf-blades entire; inflorescence many-flowered; sepals 9–10 mm long.

28. Inflorescence ellipsoid, somewhat longer than broad; leaf-blades 9–10 mm wide, soon glabrous. Amazonian Brazil. *N. myriantha.*

28. Inflorescence hemispheric, broader than long; leaf-blades 15 mm wide, the margins lanate. 15. *N. lanigera.*

21. Leaf-blades 2–4.5 mm wide.

29. Leaf-blades abruptly acute or obtuse; sepals lepidote, 10–11 mm long; petals yellow. Venezuela: Duida. *N. brachyphylla.*

29. Leaf-blades evenly long-acuminate.

30. Sepals 12–14 mm long, entire.

31. Petals yellow; sepals glabrous; leaf-blades glabrous. 16. *N. pulvinata.*

31. Petals white; sepals lepidote at the apex; leaf-blades lepidote beneath. Venezuela: Duida. *N. duidae.*

30. Sepals 6 mm long, denticulate on the keel. 17. *N. saxicola.*

12. Sepals obtuse or subacute, often cucullate.

32. Leaf-blades 9–20 mm wide.

33. Keel of the posterior sepals dilated below the apex. Venezuela: Duida. *N. xyridiflora.*

33. Keel of the posterior sepals linear or gradually narrowed from base to apex.

34. Sides of the posterior sepals 1 mm wide, their keels very narrow; inflorescence few-flowered. 18. *N. pauciflora.*

34. Sides of the posterior sepals 2 mm wide.

35. Leaf-blades with a pale contrasting median stripe, linear, not cretaceous; floral bracts serrulate. 19. *N. octopoides.*

35. Leaf-blades inconspicuously striped if at all, ligulate, conspicuously cretaceous beneath.
36. Floral bracts serrulate; sepals strongly nerved, lepidote; leaf-blades 20 mm wide. 20. *N. latifolia.*
36. Floral bracts entire; sepals even, glabrous; leaf-blades 13 mm wide. 21. *N. cretacea.*
32. Leaf-blades not more than 6 mm wide.
37. Leaf-blades serrulate throughout, glabrous beneath. 22. *N. cucullata.*
37. Leaf-blades with the apical half entire, lepidote beneath at least when young.
38. Leaf-sheaths pale brown with broad hyaline margins; floral bracts elliptic, obtuse; sepals 12 mm. long. 23. *N. umbratilis.*
38. Leaf-sheaths dark castaneous; floral bracts ovate; acute; sepals 8 mm. long. 24. *N. semiserrata.*
10. Sepals connate posteriorly or equally.
39. Sepals 4–6 mm long, acute.
40. Scape evident, raising the inflorescence above the leaf-sheaths; outer bracts short. Colombia: Cerro Chiribiquete. *N. bicolor.*
40. Scape short and wholly concealed by the leaf-bases, or none.
41. Leaf-blades 17 mm wide; plants mostly simple. Colombia: Amazonas, Vaupés. *N. heliophila.*
41. Leaf-blades 2–6 mm wide; plants mostly pulvinate.
42. Leaf-blades abruptly acute, 6 mm wide. Colombia: Araracoara. *N. acaulis.*
42. Leaf-blades acuminate, 2–3 mm wide.
43. Floral bracts much exceeding the sepals; leaf-blades soon deciduous and exposing the branched stem, 3 cm long. Colombia: Cerro del Castillo. *N. schultesiana.*
43. Floral bracts shorter than the sepals; leaf-blades persistent and concealing the stem, 7 cm long. Colombia: Chiribiquete. *N. graminifolia.*
39. Sepals 10–16 mm long.
44. Leaf-blades serrulate throughout.
45. Leaf-blades densely cinereous-lepidote beneath, abruptly acute or obtuse. 25. *N. mima.*
45. Leaf-blades soon glabrous.
46. Inner leaf-blades white at the base and forming an eye about the inflorescence.
47. Leaf-blades 8–10 mm wide; stems mostly branched and plants cushion-forming. 26. *N. pungens.*
47. Leaf-blades 1–2 mm wide, not narrowed toward the base; stems simple. 27. *N. ocellata.*
46. Inner leaf-blades concolorous like the others, narrowed toward base; sepals more than half connate.
48. Leaf-blades with a conspicuous brown cartilaginous margin, densely and distinctly serrulate. 28. *N. sandwithii.*
48. Leaf-blades with an inconspicuous almost colorless margin, laxly and obscurely serrulate. Suriname: Tafelberg. *N. maguirei.*
44. Leaf-blades entire or with a few obscure teeth near the base or the apex.
49. Sepals obtuse, 16 mm long; leaf-blades 14 mm wide. 29. *N. subpetiolata.*
49. Sepals acute, 10–12 mm long; leaf-blades 3–5 mm wide.
50. Leaf-blades spreading, flat, 5 mm wide; floral bracts wholly membranaceous. British Guiana, Venezuela. *N. gleasonii.*
50. Leaf-blades strict, involute, 3 mm wide; floral bracts subulate-thickened at the apex. 30. *N. caricifolia.*
9. Ovary partly or almost wholly inferior.
51. Sepals 28–30 mm long.
52. Ovary only ½ inferior; sepals linear, dilated and denticulate at the apex. 31. *N. immersa.*

52. Ovary almost wholly inferior; sepals narrowly triangular, acuminate, entire, auricled at the base. Colombia: Amazonas-Vaupés. *N. fontoides.*

51. Sepals 7-15 mm long.
  53. Leaf-blades 9 mm wide; stems normally elongate. 32. *N. aloifolia.*
  53. Leaf-blades 3-6 mm wide; stems short.
    54. Leaves 2-5 cm long. 33. *N. parvula.*
    54. Leaves 14 cm long. 34. *N. scopulorum.*

1. **Navia lindmanioides** L. B. Smith, sp. nov. Fig. 26.

Humilis; foliis multis, ad 34 cm longis, inflorescentiam multo superantibus, dense serrulatis, basi dissite minuteque albo-stellatis, mox glabris, vaginis parvis, suborbicularibus, brunneis, laminis linearibus, acuminatis, 15 mm latis; scapo erecto, brevi, ca. 1.5 mm diametro, minute albo-stellato, bractea unica subfoliacea paulo infra apicem aucto, alibi nudo; inflorescentia subdigitatim paniculata, tripinnata, 9-12 cm longa, dense albo-stellata; bracteis primariis infimis linearibus, serrulatis, quam ramis multo brevioribus, supremis ovatis quam eis florigeris vix majoribus; ramis subpatentibus, pauciramosis, laxe florigeris; bracteis florigeris late ovatis, acutis, 2 mm longis, tenuibus; pedicellis brevissimis crassisque; floribus patentibus; sepalis cochleari-imbricatis, liberis, oblongo-ovatis, obtusis, 4 mm longis, tenuibus; petalis ellipticis, obtusis, 5 mm longis, stamina aequantibus, albis; ovario supero, globoso, lepidoto; ovulis paucis.

TYPE: flowers white, frequent along base of escarpment at 1000 m alt., Cerro Yapacana, Río Orinoco, Amazonas, Venezuela, January 3, 1951, *B. Maguire, R. S. Cowan & J. J. Wurdack 30650.*

Number 30619 from the same locality is this species. The collectors note that the leaves are asymmetrically arranged.

2. **Navia fluviatilis** L. B. Smith, sp. nov. Fig. 27.

Humilis, acaulis, verisimiliter annua, florifera 12-21 cm alta; foliis ca. 15, suberectis, ad 13 cm longis, graminiformibus, omnino inermibus, lepidibus minutissimis dissite obtectis, vaginis ovatis, 8 mm longis, pallide brunneis, laminis linearibus, acuminatis, planis, 5 mm latis; scapo erecto, gracillimo, quam foliis multo brevioribus; scapi vaginis anguste lanceolatis, apice acuto incrassato excepto membranaceis, supremis quam internodiis brevioribus; inflorescentia simplici, laxe racemosa, glabra; bracteis florigeris eis scapi similibus, quam pedicellis duplo vel triplo brevioribus; pedicellis adscendentibus, gracillimis, 6-7 mm longis; sepalis liberis, anguste oblongis, obtusis, 2.5 mm longis, subhyalinis, juvenilibus cochleari-imbricatis; petalis anguste ellipticis, obtusis, sepala paulo superantibus, albis; staminibus inclusis; ovario supero; stylo gracili; capsula graciliter fusiformi, acuminata; seminibus angustis, fere vel omnino nudis, nigris.

TYPE: locally frequent on exposed sandstone boulders in stream bed, 1000 m alt., Membaru-Kurupung Trail, Pakaraima Mountains, British Guiana, October 29-November 4, 1951, *B. Maguire & D. B. Fanshawe 32360.*

3. **Navia hohenbergioides** L. B. Smith, sp. nov. Fig. 28.

Florifera ad 4 m alta; caule erecto, 1 m alto, 3 cm diametro; foliis ultra 6 dm longis, obscurissime dissiteque lepidotis, vaginis quam laminis laevioribus et cum spinis pallidis sed vix distinctis, laminis linearibus, acuminatis, pungentibus, 3 cm latis, nervatis, spinis atris sursum curvatis 2 mm longis laxe armatis; scapo erecto, ca. 3 cm diametro, glabro; scapi bracteis strictis, dense imbricatis, dense serratis, infimis anguste triangularibus, supremis lanceolatis; inflorescentia ample laxeque tripinnatim paniculata, glabra; axi recto; bracteis primariis supremis scapi similibus, quam basibus sterilibus ramorum multo brevioribus; ramis divergentibus, ultra 5 dm longis, laxe ramosis, basi sterili elongata, 4–7 bracteata; bracteis secundariis ovatis, acuminatis, pedunculos spicium paulo superantibus; spicis arcuato-patentibus, densissime cylindricis, 4–6 cm longis; bracteis florigeris late ovatis, acuminatis, sepala superantibus, basi carinatis, obscure serrulatis; pedicellis obconicis, brevibus; sepalis liberis, late ellipticis, acutis, 6 mm longis, coriaceis, posterioribus alato-carinatis; petalis 11 mm longis; staminibus inclusis; ovario supero; capsula globosa, quam sepalis subduplo breviore; seminibus paucis, nudis vel angustissime alatis.

TYPE: inflorescence paniculate, to 4 m tall, caudex to 1 m high, 3 cm diameter, frequent on dry rocky lower slopes at 200 m alt., Cerro Moriche, Río Ventuari, Amazonas, Venezuela, January 16, 1951, *B. Maguire, R. S. Cowan & J. J. Wurdack 30970*. Also collected here on March 9, 1953, *B. & C. K. Maguire 35535*.

I regard this as a primitive type in a genus which has evolved by reduction of floral axes and loss of seed-appendages.

4. **Navia brocchinioides** L. B. Smith, sp. nov. Fig. 29.

Caulescens ad 1 m, florifera 5 m alta; foliis ultra 1.5 m longis, vaginis vix distinctis, late ovatis, 11 cm latis, integris, pallido brunneis, subtus adpresse lepidotis, laminis linearibus, acuminatis, glabris, supra basin paulo angustatis, basi extrema spinis uncinatis atris 3 mm longis subdense armatis, alibi integerrimis; scapo 3 cm vel ultra diametro; scapi bracteis erectis, foliaceis, dense imbricatis; inflorescentia laxissime 4-pinnatim paniculata; bracteis primariis anguste triangularibus, quam basibus sterilibus nudis ramorum brevioribus; ramis ad 53 cm longis; spicis subdense multifloris, ad 26 cm longis; bracteis florigeris e late ovato acuminatis, infimis sepala subaequantibus; floribus patentibus, subsessilibus; sepalis liberis, cochleari-imbricatis, late ovatis, obtusis, 3.5 mm longis, posterioribus carinatis; petalis 6 mm longis; staminibus inclusis; ovario supero, crasse ovoideo, stylo elongato.

TYPE: terrestrial, infrequent in sabanita along granite outcrop, streamside, 650 m alt., Cerro Sipapo (Paráque), Amazonas, Venezuela, February 6, 1949, *B. Maguire & L. Politi 28787*.

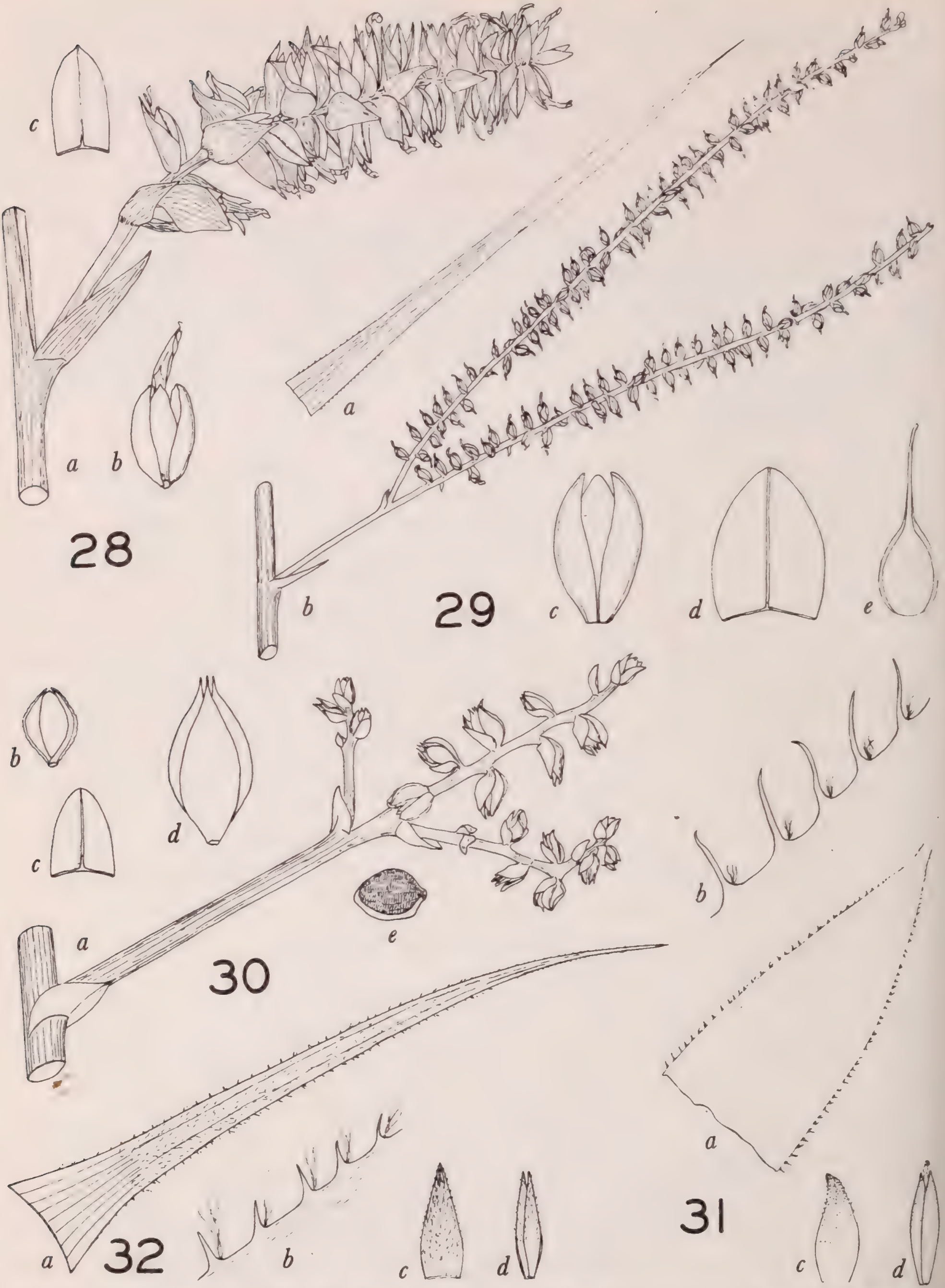
5. **Navia hechtioides** L. B. Smith, sp. nov. Fig. 30.

Florifera 3 m alta; foliis fere 1 m longis, vaginis brevibus, 6 cm latis, integris, pallide adpresseque lepidotis, laminis linearibus, 4 cm latis, basi nullo modo angustatis, in apicem crassum pungentem acuminatis, spinis subrectis atris 3 mm longis laxe armatis, supra mox glabris, subtus minutissime albo-lepidotis; scapo ignoto; inflorescentia laxissime tripinnatim paniculata, glabra; bracteis primariis late ovatis, cuspidato-acutis, quam basibus sterilibus nudis elongatis ramorum multo brevioribus; ramis patentibus; spicis patentibus, laxifloris; rhachi valde angulata; bracteis florigeris late ovatis, acutis, quam sepalis brevioribus; floribus patentibus, brevissime crasseque pedicellatis; sepalis cochleari-imbricatis, late ovatis, 10 mm longis, posterioribus alato-carinatis; petalis incompletis solum cognitis; ovario supero, crasse ovoideo; seminibus angustissime alatis, alis deciduis.

TYPE: open scrub savanna, Campo Grande, 1500 m alt., Cerro Sipapo (Paráque), Amazonas, Venezuela, December 10, 1948, *B. Maguire & L. Politi 27574*.

7. **Navia stenodonta** L. B. Smith, sp. nov. Fig. 31.

Humilis; foliis 2 dm longis, pilis albis minutissimis dissite vestitis, vaginis brevibus, late ovatis, brunneis, laminis lineari-oblongis, acutis vel acuminatis, pungentibus, 3 cm latis, spinis patentibus gracilibus pallidis 4 mm longis sub-



FIGS. 28–32. *Navia.* FIG. 28. *N. hohenbergioides* (*Maguire, Cowan & Wurdack 30970*). a, branch of inflorescence, × 1; b, flower, × 2; c, posterior sepal, × 2. FIG. 29. *N. brocchinioides* (*Maguire & Politi 28787*). a, leaf, × $\frac{1}{20}$; b, branch of inflorescence, × $\frac{1}{2}$; c, flower, × 5; d, posterior sepal, × 5; e, pistil, × 5. FIG. 30. *N. hechtioides* (*Maguire & Politi 27574*). a, branch of inflorescence, × $\frac{1}{2}$; b, young flower, × 2; c, posterior sepal, × 2; d, capsule, × 2; e, seed, × 5. FIG. 31. *N. stenodonta* (*Cowan & Wurdack 31357*). a, apex of leaf, × 1; b, margin of leaf, × 5; c, floral bract, × 1; d, flower, × 1. FIG. 32. *N. trichodonta* (*Maguire, Cowan & Wurdack 30228*). a, leaf, × 1; b, margin of leaf, × 5; c, floral bract, × 1; d, posterior sepals, × 1.

dense armatis, axillis spinarum albo-barbellatis; scapo brevi, nudo; inflorescentia densissime hemisphaerica, 3–4 cm diametro; bracteis exterioribus ex ovato acuminatis, subfoliaceis, flores aequantibus vel superantibus; bracteis florigeris ovatis, acutis, sepala paulo superantibus, pectinato-serratis, rubris, lepidibus pallidis adpressis vestitis, apice recurvatis; sepalis liberis, lanceolatis, acuminatis, 14 mm longis, nervatis, rubris, albo-lepidotis, posterioribus alato-carinatis; petalis albis; staminibus inclusis; ovario supero.

TYPE: leaves glaucous above and below, bracts pink, flowers white, stamens yellow, infrequent along west rim of cumbre at 2000 m alt., Serranía Parú, Río Parú, Caño Asísa, Río Ventuari, Amazonas, Venezuela, February 7, 1951, *R. S. Cowan & J. J. Wurdack 31357.*

8. **Navia trichodonta** L. B. Smith, sp. nov. Fig. 32.

Caulescens; foliis 8–13 cm longis, pilis albis minutis vestitis, vaginis brevibus, late ovatis, brunneis, laminis linearibus, acuminatis, 6 mm latis, spinis pallidis 0.7 mm longis laxe armatis, axillis spinarum albo-barbellatis; scapo 1 cm. longo, foliis omnino occulto; inflorescentia densissime hemisphaerica, 3–4 cm diametro, bipinnata, albo-pilosa; bracteis exterioribus foliis similibus sed valde reductis; bracteis florigeris ovatis, acutis, sepala superantibus, serrulatis, rubris; floribus breviter pedicellatis; sepalis liberis, lanceolatis, rectis, acuminatis, 15 mm longis, nervatis, rubris, posterioribus anguste alato-carinatis; petalis albis; staminibus inclusis; ovario supero.

TYPE: bracts pink, flowers white, frequent in dry places under overhanging cliffs near summit of South Escarpment, Cerro Huachamacari, Río Cunucunuma, Amazonas, Venezuela, Dec. 14, 1950, *Maguire, Cowan & Wurdack 30228.*

This species is also represented by number *29798* from the same locality at 1300 m alt.

9. **Navia viridis** L. B. Smith, sp. nov. Fig. 33.

Verisimiliter humilis; caule ignoto; foliis 5 dm longis, vaginis late ovatis, brevibus, brunneis, glabris, laminis linearibus, caudato-acuminatis, 10 mm latis, spinis patentibus pallidis ad 1 mm longis laxe armatis, supra glabris, subtus pilis albis minutis dissite vestitis, linea mediana lata pallida pictis; inflorescentia sessili, subglobosa, 25 mm diametro, e spicis brevissimis digitatim bipinnata, glabra; bracteis exterioribus foliaceis sed valde reductis; bracteis florigeris late ovatis, acuminatis et apice incrassatis, sepala superantibus sed apice reflexis, serrulatis, nervatis, viridibus; pedicellis brevibus, latis; sepalis liberis, cochleari-imbricatis, lanceolatis, acutis, 8 mm longis, valde nervatis, viridibus, posterioribus late alato-carinatis; petalis albis, imperfecte cognitis; ovario supero.

TYPE: terrestrial, flowers white, leaves pellucid green, frequent along Caño Culebra at 1400 m alt., Cerro Duida, Amazonas, Venezuela, April 24, 1949, *B. Maguire & B. Maguire, Jr. 29078.*

10. **Navia phelpsiae** L. B. Smith, sp. nov. Fig. 34.

Verisimiliter humilis; caule ignoto; foliis multis, 3 dm longis, supra glabris, subtus lepidibus linearibus sparse inconspicueque vestitis, vaginis inconspicuis quam laminis paulo latioribus, laminis linearibus, caudato-acuminatis, 15 mm latis, linea mediana lata pictis, spinis patentibus pallidis ad 1.5 mm longis laxe armatis, axillis spinarum infimarum barbellatis; inflorescentia sessili, hemisphaerica, 4–5 cm diametro, e spicis brevissimis digitatim bipinnata, mox glabra; bracteis rubris, dense serrulatis, exterioribus subfoliaceis sed valde reductis, bracteis florigeris lanceolatis vel ovatis, acuminatis, rectis, sepala superantibus, dense serrulatis, subcoriaceis; pedicellis brevissimis; sepalis liberis, lanceolatis, acutis, 12–18 mm longis, nervatis, rubris, posterioribus anguste alato-carinatis, petalis staminibusque ignotis; ovario supero.

TYPE: on rocks in scrub woodland, south escarpment slopes, Cerro Guanay, 1200–1800 m alt., Caño Guaviarito, Río Manapiare, Río Ventuari, Amazonas, Venezuela, February 4, 1951, *B. Maguire, K. D. Phelps, C. B. Hitchcock & G. Budowski 31762.*

VENEZUELA: Amazonas: Cerro Yutaje: occasional in thickets near Camp Yutaje at 1300 m alt., February 8, 1953, *B. & C. K. Maguire 35090.* Frequent in shaded places along caño or in woodland, along left fork of Caño Yutaje at 1250 m February 12, 1953, *B. & C. K. Maguire 35216.* Frequent in left branch of Caño Yutaje at 1200 m alt., February 25, 1953, *B. & C. K. Maguire 35416.*

In the material from Cerro Yutaje the minute linear white trichomes of the inflorescence are much more persistent than in the type.

11. **Navia serrulata** L. B. Smith, sp. nov. Fig. 35

Habitus ignotus; foliis plurimis, 36 cm longis, vaginis late ellipticis, 2 cm longis, quam laminis multo latioribus, apice brunneis serrulatisque, laminis linearibus, longe acuminatis, 5–6 mm latis, dense minuteque serrulatis, subtus dense albo-lepidotis; scapo gracili, vaginas foliorum superante; inflorescentia myriantha, verisimiliter simplex, crasse ovoidea, late obtusa, 25 mm longa, glabra; bracteis exterioribus subfoliaceis, inflorescentiam involucrantibus et superantibus; bracteis florigeris lanceolatis, acutis, quam sepalis paulo brevioribus, serrulatis; pedicellis brevissimis; sepalis liberis, lanceolatis, acutis, 7–9 mm longis; petalis sepala vix superantibus; antheris exsertis, linearibus, 3 mm longis; ovario supero.

TYPE: bracts pinkish, flowers yellowish, frequent on northwest slopes at 800 m alt., Cerro Yapacana, Río Orinoco, Amazonas, Venezuela, January 1, 1951, *B. Maguire, R. S. Cowan & J. J. Wurdack 30521.*

VENEZUELA: Amazonas: common on rocks in more exposed woodland below Intermediate Camp at 800–1000 m, Cerro Yutaje, Serranía Yutaje, Río Manapiare, February 4, 1953, *B. & C. K. Maguire 35056.*

12. **Navia colorata** L. B. Smith, sp. nov. Fig. 36.

Caulescens, ramosa; foliis in rosulis terminalibus, 15–25 cm longis, subtus et basi supra pilis minutis albis dissite vestitis, foliis interioribus cum bracteis basi albis vel rubris et aream coloratam magnam circa inflorescentiam formantibus, vaginis parvis, late ovatis, brunneis, laminis linearibus, longe acuminatis, 8–11 mm latis, spinis gracilibus pallidis 0.5–1.5 mm longis subdense armatis, scapo brevi, nudo; inflorescentia subhemisphaerica, 15–25 mm diametro, bipinnata, multiflora; bracteis exterioribus subfoliaceis, inflorescentiam involucrantibus et multo superantibus; bracteis florigeris ovatis, acutis, 7–8 mm longis, integris, apice lepidotis; pedicellis brevibus, latis; sepalis liberis, lanceolatis, acutis, 9 mm longis, apice inflexis lepidotisque, posterioribus anguste alato-carinatis; petalis aureis; ovario supero.

TYPE: flowers yellow, leaves around flowering heads white basally, turning green in the next seasons, on cliffs at the base of the escarpment at 1800 m alt.,

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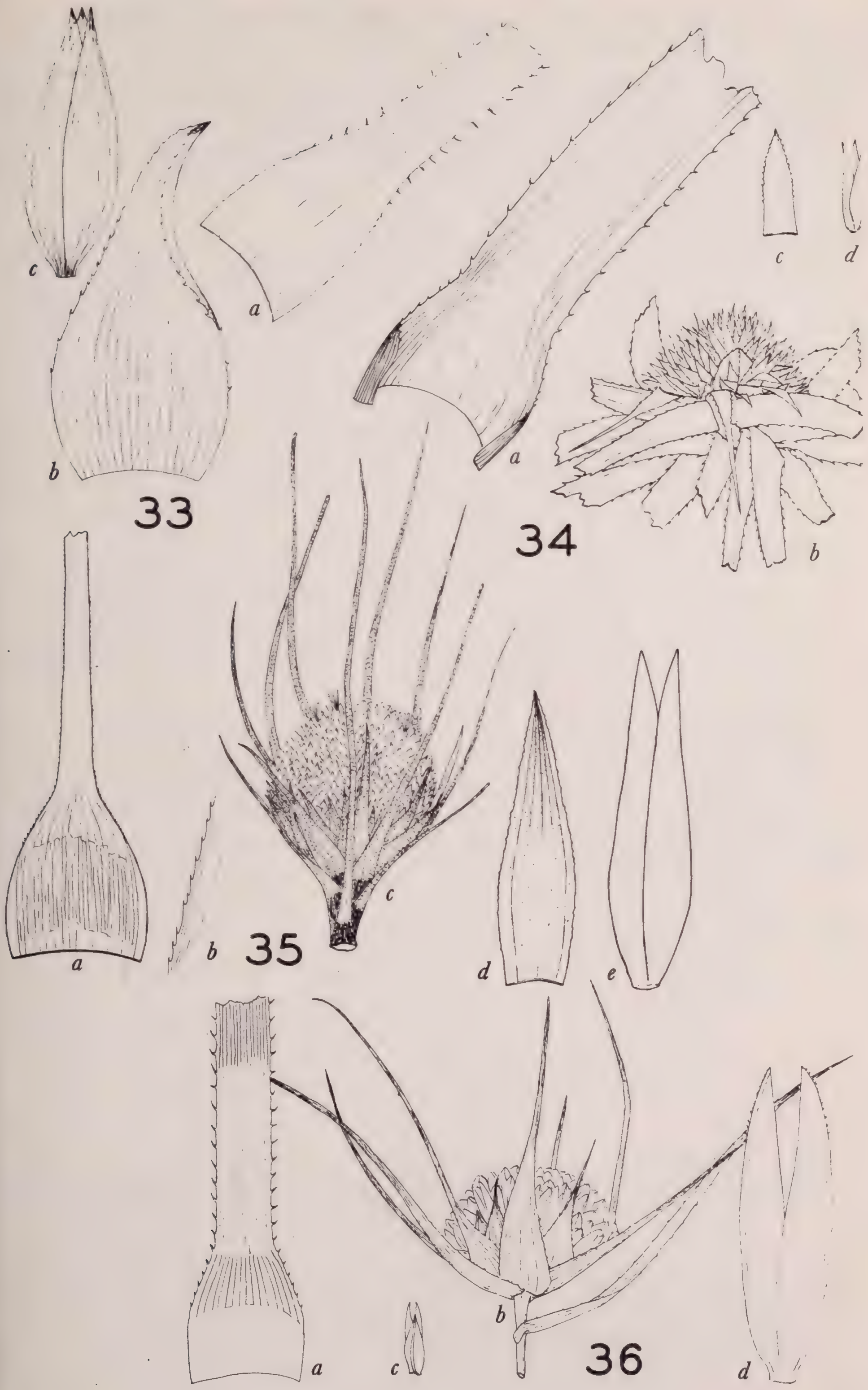
Explanation of figures 33–36

FIGS. 33–36. *Navia.* FIG. 33. *N. viridis* (*Maguire & Maguire 29078*). a, base of leaf, × 1; b, floral bract × 5; c, sepals, × 5. FIG. 34. *N. phelpsiae* (*Maguire, Phelps, Hitchcock & Budowski 31762*). a, base of leaf, × 1; b, inflorescence, × $\frac{1}{2}$; c, floral bract, × 1; d, sepals, × 1. FIG. 35. *N. serrulata* (*Maguire, Cowan & Wurdack 30521*). a, base of leaf, × 1; b, margin of leaf, × 5; c, inflorescence, × 1; d, floral bract, × 5; e, posterior sepals, × 5. FIG. 36. *N. colorata* (*Cowan & Wurdack 31417*). a, base of leaf, × 1; b, inflorescence, × 1; c, floral bract and sepals, × 1; d, posterior sepals, × 5.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Serranía Parú, Río Parú, Caño Asísa, Río Ventuari, Amazonas, Venezuela, February 12, 1951, *R. S. Cowan & J. J. Wurdack 31417.*

The species is also represented from this region by number *31262*, 1–4 rosettes per caudex, basal half of central leaves rose-colored, frequent in open rocky sabanitas along West Rim, cumbre at 2000 m alt.; and by number *31358*, flowers yellow, interior leaves basally pink, apically red-green, occasional along West Rim, cumbre at 2000 m alt.

An unnumbered collection of the species was made in this locality by K. D. Phelps and C. B. Hitchock on February 11, 1949.

13. **Navia involucrata** L. B. Smith, sp. nov. Fig. 37

Humilis; foliis multis, 17 cm longis, vaginis late ovatis, brevibus, brunneis, laminis anguste triangularibus, acuminatis, pungentibus, 18 mm latis, dense serrulatis, concoloribus, supra dense minuteque albo-flocculosis, subtus mox glabris; scapo gracili, 20–25 mm longo, nudo; inflorescentia hemisphaerica, 2–3 cm diametro; bracteis exterioribus e base late ovata acuminatis, serrulatis, crasse coriaceis, ex sicco flavis, inflorescentiam involucrantibus longe superantibus et fere omnino obtegentibus; bracteis florigeris lanceolatis, acutis, sepala subaequantibus, integris, parte superiore incrassata, minute lepidota; pedicellis brevibus; sepalis liberis, lanceolatis, acutis, 14 mm longis, apice lepidotis, posterioribus carinatis, basi anguste alatis, apice obscure dentatis; petalis aureis, stamina subaequantibus; ovario supero.

TYPE: flowers yellow, frequent along cumbre of West Rim at 2000 m alt., Serranía Parú, Río Parú, Caño Asísa, Río Ventuari, Amazonas, Venezuela, February 7, 1951, *Cowan & Wurdack 31359.*

Number *31360* is fruiting material of this species from the same place, and *K. D. Phelps and C. B. Hitchcock 527* is immature.

14. **Navia nubicola** L. B. Smith, sp. nov. Fig. 38.

Breviter caulescens; caule simplici; foliis ex comparatione paucis, ad 38 cm longis, vaginis parvis, late ovatis, laminis linearibus, acuminatis, basi attenuatis, 16 mm latis, ex sicco tenuibus, subdense serrulatis, linea mediana pallida pictis, supra glabris, subtus dense adpresseque cinereo-lepidotis; inflorescentia nidulante, globosa sed subpauciflora, 20–25 mm diametro, simplici; bracteis exterioribus subfoliaceis, inflorescentiam superantibus; bracteis florigeris ellipticis, sepala superantibus, integris, membranaceis, apice dense lepidotis; floribus subsessilibus; sepalis liberis, lanceolatis, late acutis, 14 mm longis, apice inflexis et dense lepidotis, membranaceis, lateralibus anguste carinatis; petalis albis; ovario supero; capsula ellipsoidea, rostro brevi excluso 5 mm longa.

TYPE: terrestrial, flowers white, locally abundant in slope forest between Camps 2 and 3 at 200–500 m alt., Cerro de la Neblina, Río Yatua, Amazonas, Venezuela, January 29, 1954, *B. Maguire, J. J. Wurdack & G. S. Bunting 37392.*

The species is further represented by numbers *37382* and *36801* from the vicinity of the type locality.

15. **Navia lanigera** L. B. Smith, sp. nov. Fig. 39.

Imperfecte solum cognita, verisimiliter caulescens; laminis foliorum angus-

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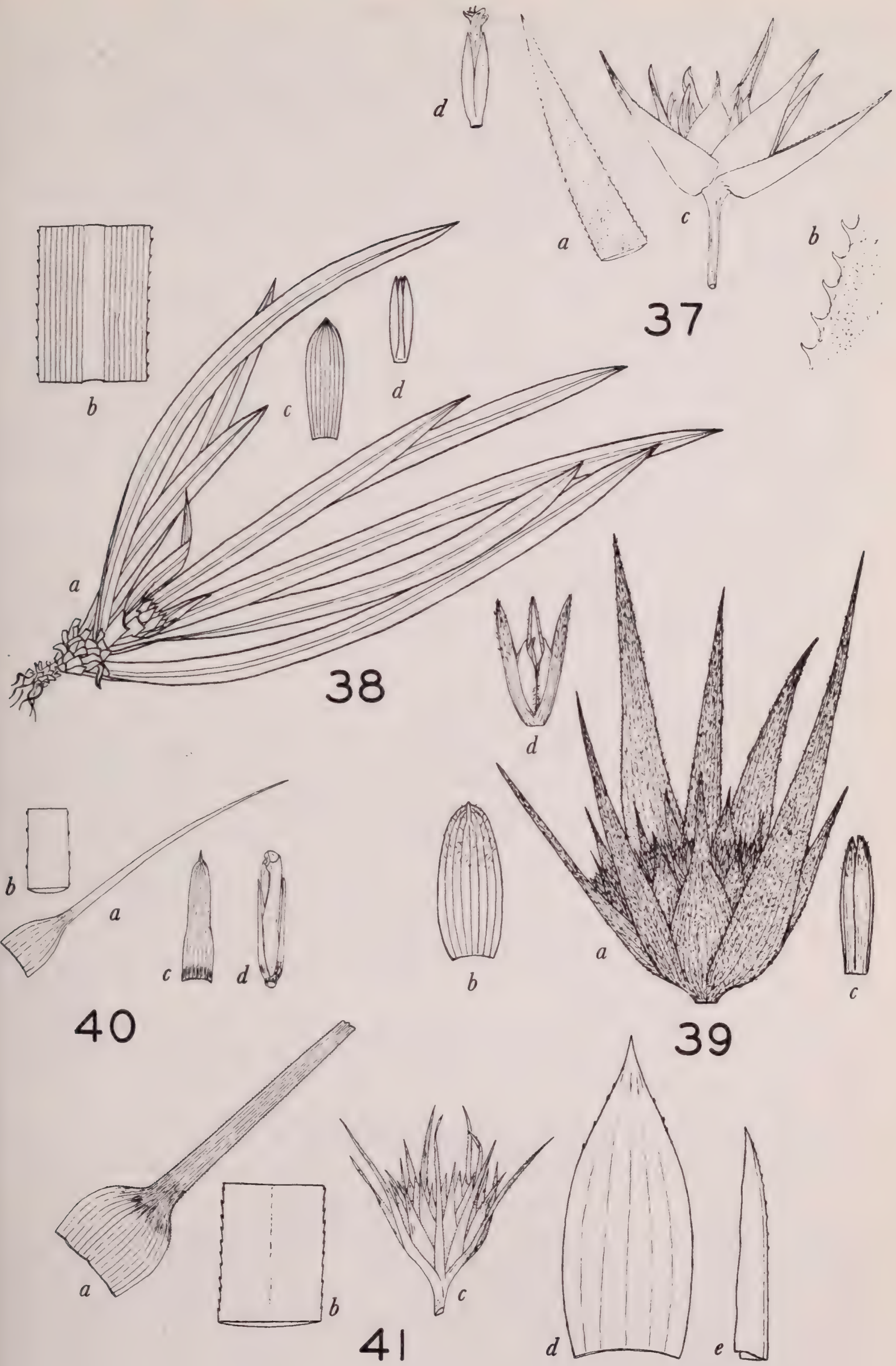
Explanation of figures 37–41

FIGS. 37–41. *Navia.* FIG. 37. *N. involucrata* (*Cowan & Wurdack 31359*). a, apex of leaf, × 1; b, margin of leaf, × 5; c, inflorescence, × ½; d, flower, × 1. FIG. 38. *N. nubicola.* a, habit, × ¼; b, part of leaf, × 1; c, floral bract, × 1; d, sepals, × 1. FIG. 39. *N. lanigera* (*Maguire, Phelps, Hitchcock & Budowski 31794*). a, inflorescence, × 1; b, floral bract, × 2; c, posterior sepals, × 2; d, fruit, × 2. FIG. 40. *N. pulvinata* (*Maguire & Maguire 29111*). a, leaf, × 1; b, part of leaf, × 5; c, outer bract of inflorescence, × 1; d, flower, × 1. FIG. 41. *N. saxicola* (*Maguire, Cowan & Wurdack 30680*). a, base of leaf, × 1; b, part of leaf, × 5; c, inflorescence, × 1; d, floral bract, × 5; e, posterior sepal, × 5.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tissime triangularibus, 18 cm longis, 15 mm latis, integris, margine dense albo-lanatis, supra glabris, subtus albo-flocculosis; inflorescentia nidulante, hemisphaerica, multiflora, 3 cm diametro, albo-flocculosa; bracteis exterioribus, subfoliaceis, flores multo superantibus; bracteis florigeris ellipticis, acutis, sepala subaequantibus, integris, apice incrassatis; sepalis liberis, lanceolatis, acutis, apice inflexis, 9 mm longis, tenuibus; ovario supero.

TYPE: frequent on rocks on summit at 1800 m alt., Cerro Camani, Caño Guaviarito, Río Manapiare, Río Ventuari, Amazonas, Venezuela, February 12, 1951, *B. Maguire, K. D. Phelps, C. B. Hitchcock & G. Budowski 31794.*

16. **Navia pulvinata** L. B. Smith, sp. nov. Fig. 40.

Humilis, pulvinata; caule ramoso, foliis vetustis persistentibus dense obtecto; foliis vivis plurimis, in apicibus caulis rosulatis, glabris, vaginis parvis, late ovatis, pallide brunneis, subhyalinis, laminis patentibus, linearibus, acuminatis, 4 cm longis, basi vix 2 mm latis, minutissime laxeque serrulatis; inflorescentia sessili, pauciflora, glabra; bracteis exterioribus e foliis gradatim reductis; bracteis florigeris oblongis, acutis, quam sepalis brevioribus, integris, tenuibus; pedicellis brevibus; sepalis liberis, linearibus, acutis, 14 mm longis, posterioribus carinatis; petalis aureis; staminibus inclusis; ovario supero.

TYPE: flowers yellow, bracts orange, pulvinate on dry exposed rock, near summit of Cerro Culebra at 1600 m alt., Cerro Duida, Amazonas, Venezuela, April 24, 1949, *B. Maguire & B. Maguire, Jr. 29111.*

The same species is represented by *Maguire, Cowan, & Wurdack 29609*, flowers orange-red, densely pulvinate on vertical cliffs, frequent, North Escarpment, at 1200 m alt., Cerro Duida.

17. **Navia saxicola** L. B. Smith, sp. nov. Fig. 41.

Humilis, verisimiliter pulvinata; parte brevi caulis solum cognita, foliis vetustis dense obtecta; foliis vivis plurimis, apice caulis rosulatis, juvenilibus pilis albis minutis dissite obtectis, mox glabris, vaginis parvis, suborbicularibus, basi hyalinis, apice atro-castaneis, laminis patentibus, linearibus, acuminatis, 8 cm longis, 3 mm latis, basi dense minuteque serrulatis, alibi laxius; scapo brevi, nudo; inflorescentia e centro foliorum parum exserta; bracteis exterioribus foliaceis sed valde reductis; bracteis florigeris ovatis, sepala superantibus, basi hyalinis, apice brunneis incrassatis et obscurissime serrulatis; pedicellis brevibus; sepalis liberis, oblongis, acutis, 6 mm longis, posterioribus, alato-carinatis, carina denticulata; petalis albis, stamina subaequantibus; antheris apice dehiscentibus; ovario supero.

TYPE: flowers white, base of center (young) leaves white, frequent on rocks, cumbre at 1200 m alt., Cerro Yapacana, Río Orinoco, Amazonas, Venezuela, January 3, 1951, *B. Maguire, R. S. Cowan & J. J. Wurdack 30680.*

18. **Navia pauciflora** L. B. Smith, sp. nov. Fig. 42.

Humilis, forsan pulvinata; foliis ad 11 cm longis, vaginis parvis, quam laminis

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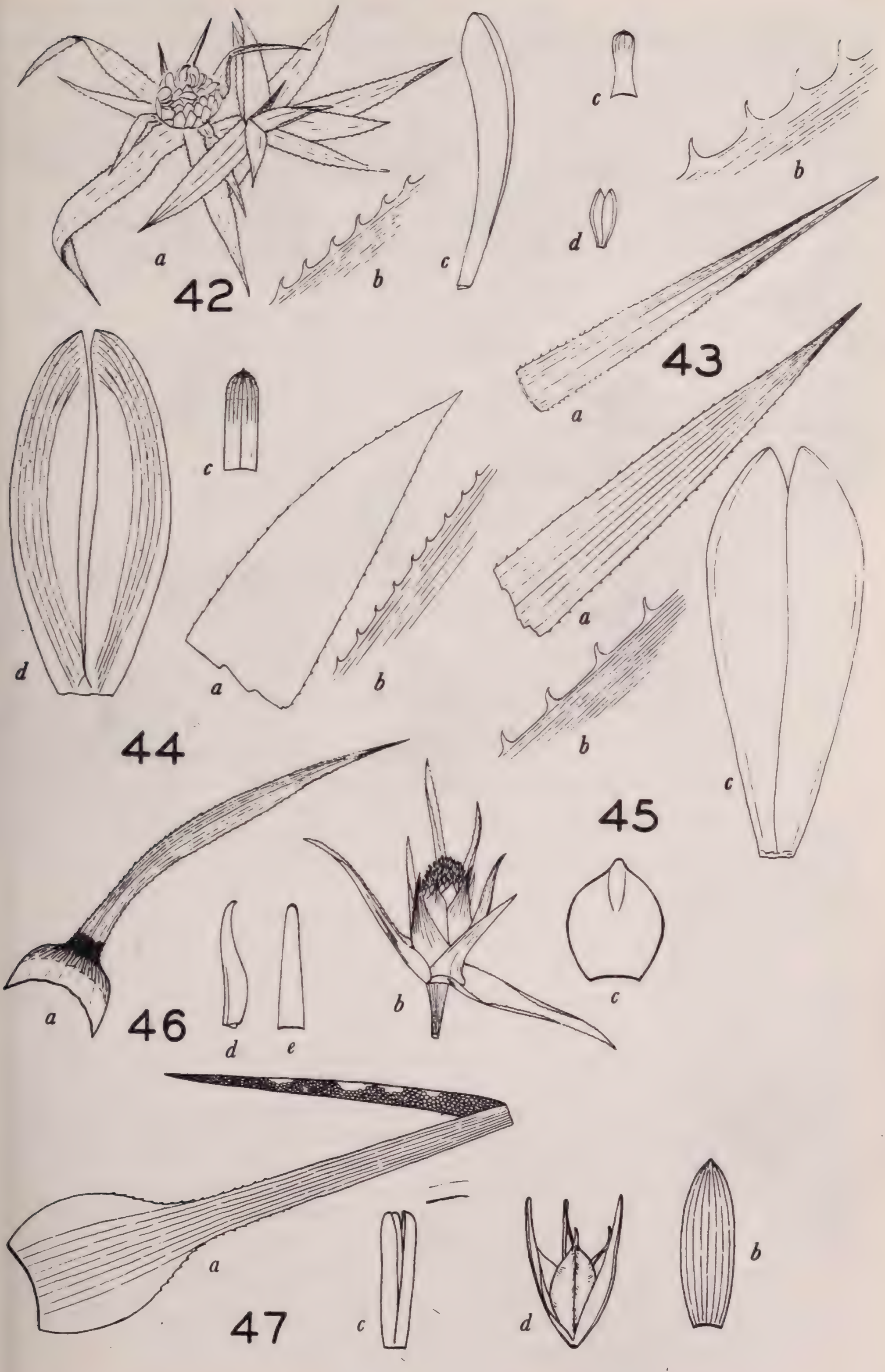
Explanation of figures 42–47

FIGS. 42–47. *Navia.* FIG. 42. *N. pauciflora* (*Maguire & Maguire 29154*). a, habit, × ½; b, margin of leaf, × 5; c, posterior sepal, × 5. FIG. 43. *N. octopoides* (*Maguire & Maguire 29151*). a, apex of leaf, × 1; b, margin of leaf, × 5; c, floral bract, × 1; d, posterior sepals, × 1. FIG. 44. *N. latifolia* (*Maguire, Cowan & Wurdack 29642*). a, apex of leaf, × 1; b, margin of leaf, × 5; c, floral bract, × 1; d, posterior sepals, × 5. FIG. 45. *N. cretacea* (*Maguire, Cowan & Wurdack 29682*). a, apex of leaf, × 1; b, margin of leaf, × 5; c, posterior sepals, × 5. FIG. 46. *N. cucullata* (*Maguire 32766*). a, leaf, × 1; b, inflorescence, × 1; c, floral bract, × 2; d, posterior sepal, × 2; e, anterior sepal, × 2. FIG. 47. *N. umbratilis* (*Maguire & Maguire 35406*). a, leaf, × 1; b, floral bract, × 2; c, sepals, × 2; d, fruit, × 2.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vix latioribus, brunneis, subglabris, laminis linearibus, acuminatis, pungentibus, 10 mm latis, serrulatis, supra glabris, subtus lepidibus cinereis adpressis omnino obtectis; inflorescentia sessili, pauciflora; bracteis exterioribus omnino foliaceis sed reductis; bracteis florigeris ellipticis, obtusis, sepala subaequantibus, integris, apice lepidotis; floribus subsessilibus; sepalis liberis, anguste spathulatis, late obtusis, 8 mm longis, 2 mm latis, posterioribus angustissime alato-carinatis, incurvatis; petalis staminibusque non visis; ovario supero; capsulis quam sepalis brevioribus; seminibus nudis.

TYPE: on banks and rocks, flowers white, common, Cerro Marahuaca, Amazonas, Venezuela, April 23, 1949, *B. Maguire & B. Maguire, Jr. 29154.*

19. **Navia octopoides** L. B. Smith, sp. nov. Fig. 43.

Humilis; foliis multis, ad 21 cm longis, vaginis brevibus, vix distinctis, laminis linearibus, acuminatis, 10 mm latis, subdense serrulatis, glabris, linea mediana lata pallida pictis; inflorescentia sessili, subglobosa, multiflora, 3 cm diametro; bracteis exterioribus omnino foliaceis sed reductis; bracteis florigeris panduratis, late rotundatis apiculatisque, sepala subaequantibus, tenuibus, nervatis, apice incrassatis lepidotis serrulatisque; pedicellis brevibus latisque; sepalis liberis, obovatis, late subacutis, incurvatis, 7 mm longis, 4 mm latis, posterioribus late alato-carinatis, carina lineari, acuminata; petalis staminibusque ignotis; ovario supero.

TYPE: terrestrial, flowers white, frequent in mixed forest near base of north slope, Cerro Duida, 3 miles south of Culebra, Amazonas, Venezuela, April 24, 1949, *B. Maguire & B. Maguire, Jr. 29151.*

20. **Navia latifolia** L. B. Smith, sp. nov. Fig. 44.

Humilis, habitum *N. cretaceae* imitans; foliis multis, 16 cm longis, vaginis parvis, brunneis, glabris, laminis oblongis, acutis vel acuminatis, 20 mm latis, dense serrulatis, supra glabris, subtus pulvere cretaceo niveo dense obtectis; inflorescentia sessili, hemisphaerica, 4 cm diametro; bracteis exterioribus foliaceis sed reductis; bracteis florigeris panduratis, late rotundatis apiculatisque, sepala subaequantibus, valde nervatis, apice serrulatis et lepidotis; pedicellis brevibus, latis; sepalis liberis, obovatis, 10 mm longis, valde nervatis, apice dissite lepidotis, posterioribus late alato-carinatis, incurvatis; petalis albis, laminis magnis; staminibus inclusis; ovario supero.

TYPE: leaves densely farinose below, flowers white, occasional in spray of upper falls, Caño Culebra at 1300 m alt., Cerro Duida, Río Cunucunuma, Amazonas, Venezuela, November 21, 1950, *B. Maguire, R. S. Cowan & J. J. Wurdack 29642.*

21. **Navia cretacea** L. B. Smith, sp. nov. Fig. 45.

Humilis; foliis multis, ca. 13 cm longis, vaginis brevibus, late ovatis, brunneis, laminis linearibus, acuminatis, 9–13 mm latis, subdense serrulatis, fere vel omnino concoloribus, supra glabris, subtus pulvere cretaceo niveo dense obtectis; inflorescentia sessili, hemisphaerica, 25 mm diametro; bracteis exterioribus foliaceis sed reductis; bracteis florigeris late oblongis, acutis, sepala subaequantibus, integris, laevibus, glabris; pedicellis brevibus, latis; sepalis liberis, obovatis, 12 mm longis, laevibus, glabris, posterioribus carinatis, incurvatis; petalis albis, laminis magnis; staminibus inclusis; ovario supero.

TYPE: flowers white, wet places on cliffs, diagonal ledge up south escarpment at 1400 m alt., Cerro Huachamacari, Río Cunucunuma, Amazonas, Venezuela, December 5, 1950, *B. Maguire, R. S. Cowan & J. J. Wurdack 29882.*

The species is also represented by number *30176* from the same mountain, flowers white, frequent on rocks, Right Fork Caño de Dios at 1800 m alt.

22. **Navia cucullata** L. B. Smith, sp. nov. Fig. 46.

Verisimiliter caulescens; foliis multis, apice caulis densissime aggregatis, ad 9 cm longis, axillis spinarum infimarum barbellatis exceptis glabris, foliis interioribus cum bracteis basi albis et aream coloratam magnam circa inflorescentiam formantibus, vaginis reniformibus, 15 mm latis, atro-brunneis, laminis linearibus, acuminatis, rigidis pungentibusque, 5-6 mm latis, basi paulo attenuatis, subtus valde nervatis, spinis minutis subdense serrulatis; scapo brevi, nudo; inflorescentia simplici, pauciflora, 8 mm diametro, glabra; bracteis exterioribus subfoliaceis sed valde reductis; bracteis florigeris ellipticis, obtusis, integris, apice incrassatis, quam sepalis brevioribus; sepalis liberis, sublinearibus, cucullatis, 9 mm longis, posterioribus basi anguste alato-carinatis; petalis albis (! Maguire); ovario supero.

TYPE: frequent on rocks near cumbre camp at 2000 m alt., Cerro Guaiquinima, Río Paragua, Bolívar, Venezuela, December 25, 1951, *B. Maguire 32766*.

The species is also represented by number *32824* from rocks in open savannas 1 km south of cumbre camp at 1800 m and by number *33098*, a form with slightly broader leaves from a cliff face at waterfalls, North Valley, 1600-1700 m, both from the same region as the type.

23. **Navia umbratilis** L. B. Smith, sp. nov. Fig. 47.

Imperfecte solum cognita, verisimiliter caulescens; foliis multis, vaginis late ovatis, ca. 25 mm longis, pallide brunneis, margine late hyalinis, laminis linearibus, acuminatis, basi haud attenuatis, ad 16 cm longis, 5 mm latis, supra glabris, subtus dense adpresseque cinereo-lepidotis, anguste cartilagineo-marginata, basi laxe minuteque serrulata; inflorescentia nidulante, simplici, subglobosa, 1 cm diametro; bracteis exterioribus foliaceis sed reductis; bracteis florigeris ellipticis, late obtusis apiculatisque, sepala subaequantibus, integris, plus minusve cucullatis, tenuibus, cinereo-lepidotis; sepalis liberis, 12 mm longis, anguste lanceolatis, anteriore obtuso, posterioribus carinatis, valde cucullatis, tenuibus, glabris; petalis staminibusque ignotis; ovario supero; capsula ellipsoidea, 6 mm longa; seminibus nudis vel alis minimis deciduis praeditis.

TYPE: terrestrial herb, shade form with leaves more slender and without white bases, common near seepage at 200 m up left branch of Caño Yutaje at 1200 m alt., Serranía Yutaje, Río Manapiare, Amazonas, Venezuela, February 25, 1953, *B. & C. K. Maguire 35406*.

24. **Navia semiserrata** L. B. Smith, sp. nov. Fig. 48.

Humilis, pulvinata; caule ramoso, basibus foliorum vetustorum dense obtecto; foliis vivis multis, in apicibus caulis rosulatis, vaginis parvis, late ovatis, atro-castaneis, glabris, laminis linearibus, acuminatis, 6-7 cm longis, 3-4 mm latis, subtus adpresse albo-lepidotis, mox glabris, parte basali dense minuteque serrulata, parte apicali integra; scapo brevi, nuda; inflorescentia e centro foliorum exserta, globosa, 14 mm diametro; bracteis exterioribus foliaceis sed valde reductis; bracteis florigeris ovatis, sepala paulo superantibus, integris, tenuibus, apice abrupte acutis incrassatisque, dissite albo-lepidotis; pedicellis brevibus; sepalis liberis, lanceolatis, apice abrupte inflexis, 8 mm longis, glabris, posterioribus anguste alato-carinatis; petalis albis; staminibus inclusis; ovario supero.

TYPE: flowers white, frequent, dominant cumbre rock cover, cushions to 3 m diameter, Cerro Moriche at 1250 m alt., Río Ventuari, Amazonas, Venezuela, January 15, 1951, *B. Maguire, R. S. Cowan & J. J. Wurdack 30959*.

Number *30863* is the same species: flowers white, frequent on rocks, upper cliffs at 1000 m alt., Cerro Moriche.

25. **Navia mima** L. B. Smith, sp. nov. Fig. 49.

Humilis, habitum *N. brachyphyllae* valde imitans; caule simplici, erecto, robusto, 4–10 cm alto, foliis vetustis obtecto; foliis vivis apice caulis rosulatis, multis, 9–13 cm longis, vaginis brevibus, late ovatis, aterrime castaneis, glabris, laminis linearibus, abrupte acutis vel obtusis, 5–7 mm latis, crasse coriaceis, dense minuteque serrulatis, supra glabris, subtus lepidibus cinereis adpressis omnino obtectis; inflorescentia sessili, pauciflora; bracteis exterioribus omnino foliaceis sed reductis; bracteis florigeris ellipticis, obtusis, quam sepalis paulo brevioribus, castaneis, apice incrassatis et dense cinereo-lepidotis; pedicellis brevibus; sepalis oblongis, obtusis, 15 mm longis, ad 6.5 mm connatis, tenuibus, castaneis, posterioribus carinatis; petalis staminibusque valde imperfecte cognitis; ovario supero.

TYPE: bracts white, leaves coriaceous, on exposed rocks and dry cliff ledges, frequent, Campo Grande, 1500 m alt., Cerro Sipapo, Terr. Amazonas, Venezuela, Dec. 11, 1948, *B. Maguire & L. Politi 27590.*

The species is also represented by number *28680* from the same region, East Basin summits, frequent at 2000 m alt.

26. **Navia pungens** L. B. Smith, sp. nov. Fig. 50.

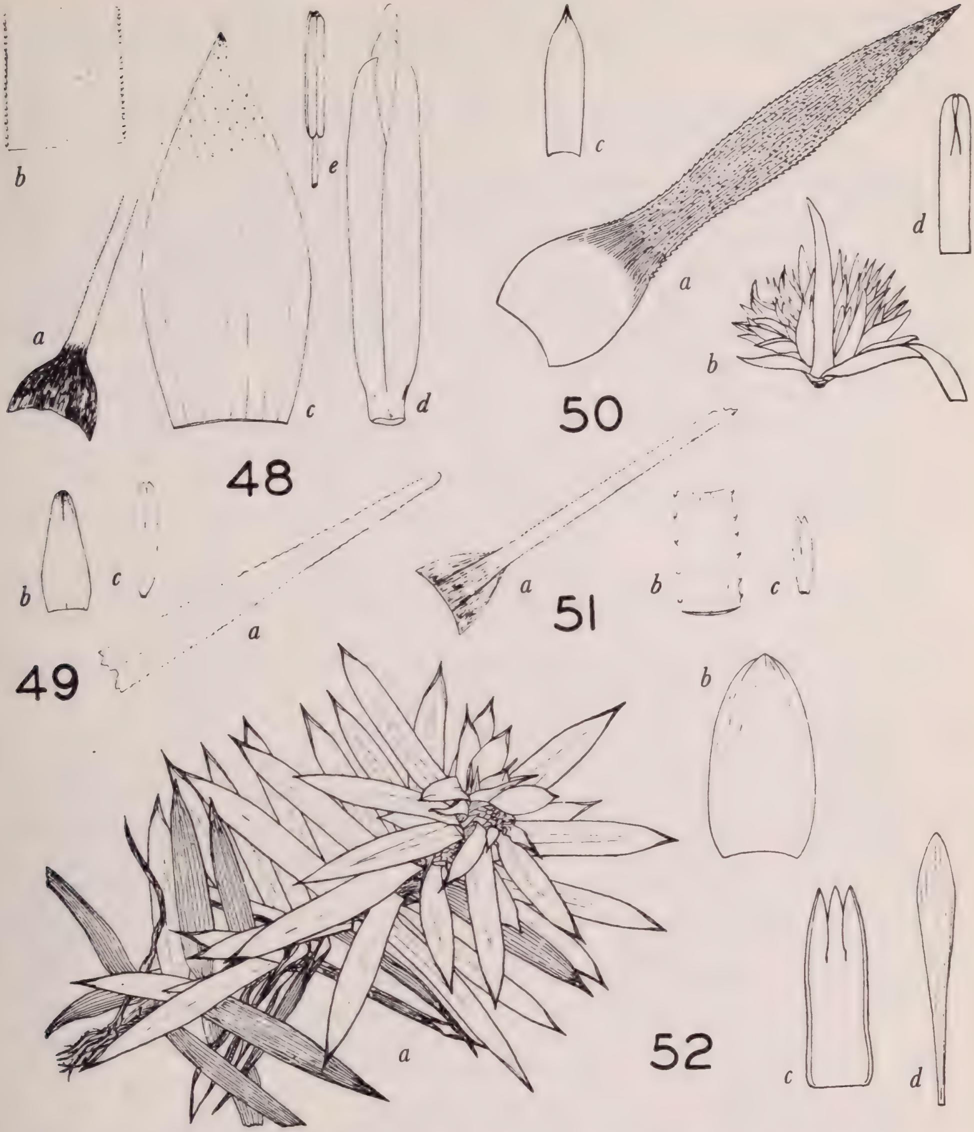
Simplex vel pulvinata; caule 1 cm diametro; foliis apicalibus solum cognitis, vaginis late ovatis, apice serrulatis et ex sicco brunneo-rubentibus, alibi integris pallidisque, laminis lineari-lanceolatis vel linearibus, acuminatis, basi paulo attenuatis albisque, 5–10 cm longis, 8–10 mm latis, angustissime cartilagineo-marginatis, subtus dense adpresseque cinereo-lepidotis, mox omnino glabris, laxe serrulatis; inflorescentia nidulante, subglobosa, 10–15 mm diametro; bracteis exterioribus foliaceis sed valde reductis; bracteis florigeris ellipticis, acuminatis, sepala subaequantibus, brunneis, paulo lepidotis, basi membranaceis, apice valde incrassatis pungentibusque; floribus subsessilibus; sepalis cochleari-imbricatis, oblongis, acutis, 11–14 mm longis, omnibus alte connatis, posterioribus anguste alato-carinatis, apice inflexis; petalis flavis; ovario supero; capsula ovoidea, acuta, 7 mm longa.

TYPE: cushion-former on rock face, leaf-bases white, common in deciduous woodland between Campo Verada and Campo M. Perez, Caño Verada at 900–1100 m alt., Cerro Guanay, Caño Guaviarito, Río Manapiare, Río Ventuari, Amazonas, Venezuela, January 30, 1951, *B. Maguire, K. D. Phelps, C. B. Hitchcock & G. Budowski 31652.*

VENEZUELA: Amazonas: solitary or forming cushions on rocks, common on summit at 1800 m alt., Cerro Guanay, Caño Guaviarito, Río Manapiare, Río Ventuari, February 4, 1951, *B. Maguire, K. D. Phelps, C. B. Hitchcock & G. Budowski 31753.* Common on rocks along left fork of Caño Yutaje at 1250 m alt., Cerro Yutaje, Serranía Yutaje, Río Manapiare, February 12, 1953, *B. & C. K. Maguire 35215.*

27. **Navia ocellata** L. B. Smith, sp. nov. Fig. 51.

Humilis; caule simplici, erecto vel adscendente, ultra 17 cm longo, foliis vetustis longe persistentibus densissime vestito; foliis vivis plurimis, apice caulis rosulatis, patentibus, foliis interioribus cum bracteis basi albis et aream coloratam circa inflorescentiam formantibus, vaginis late ovatis, parvis, atris, laminis linearibus, acuminatis, 12 cm longis, 1–2 mm latis, basi haud angustatis, laxe minuteque serrulatis, marginibus dissite lepidotis, mox glabris; inflorescentia sessili, ovoidea, 13 mm diametro, glabra; bracteis exterioribus e foliis gradatim reductis; bracteis florigeris ovatis, apiculatis, quam sepalis paulo brevioribus, tenuibus; pedicellis brevibus, latis; sepalis oblongis, acutis, 10 mm longis, alte connatis, tenuibus, glabris; petalis aureis; staminibus inclusis; ovario supero.



FIGS. 48–52. *Navia*. FIG. 48. *N. semiserrata* (*Maguire, Cowan & Wurdack 30959*). a, leaf, × 1; b, part of leaf-blade, × 5; c, floral bract, × 5; d, flower, × 5; e, anther, × 5. FIG. 49. *N. mima* (*Maguire & Politi 27590*). a, apex of leaf, × 1; b, floral bract, × 1; c, posterior sepals, × 1. FIG. 50. *N. pungens* (*Maguire, Phelps, Hitchcock & Budowski 31652*). a, leaf, × 1; b, inflorescence, × 1; c, floral bract, × 2; d, sepals, × 2. FIG. 51. *N. ocellata* (*Maguire & Politi 27500*). a, base of leaf, × 1; b, part of leaf-blade, × 5; c, posterior sepals, × 1. FIG. 52. *N. sandwithii* (*Sandwith 1285*). a, habit, × $\frac{1}{2}$; b, floral bract, × 2; c, sepals, × 2; d, petal × 2.

TYPE: frequent, hanging on wet cliffs, lower North Escarpment at 1300 m alt., Cerro Sipapo (Paráque), Amazonas, Venezuela, Dec. 1–3, 1948, *B. Maguire & L. Politi 27500.*

The species is also represented by number *27866* from the same locality at 1400 m alt.

28. **Navia sandwithii** L. B. Smith, sp. nov. Fig. 52.

Caulescens; caule ad 28 cm longo, 4 mm diametro, foliis fere omnino occulto; foliis ad 14 cm longis, vaginis late ovatis, 1 cm longis, brunneis, glabris, laminis lineari-lanceolatis, acuminatis, basi attenuatis, 14–17 mm latis, anguste brunneo-marginatis, dense serrulatis, basi lepidoto-ciliatis, alibi glabris, pallide viridibus, ex sicco linea mediana albida pictis; inflorescentiis nidulantibus, terminalibus dein pseudolateralibus, simplicibus, paucifloris, 15 mm diametro; bracteis exterioribus foliaceis sed valde reductis; bracteis florigeris ovatis, obtusis apiculatisque, integris, tenuibus, glabris; sepalis oblongis, obtusis, 10–13 mm longis, alte connatis, posterioribus anguste alato-carinatis; petalis acutis, vix unguiculatis, 18 mm longis, albis, staminibus subaequantibus sed reflexis; ovario supero; capsula ellipsoidea, 5 mm longa; seminibus nudis, atris, verrucoso-sulcatis.

TYPE: on cliff face at the top of precipices and under boulders on precipices at 360 m alt., Kaieteur Falls, British Guiana, September 1–8, 1937, *N. Y. Sandwith 1285,* Kew.

BRITISH GUIANA: Dry rock shelf, 1 mile below Kaieteur Falls, Potaro River Gorge, May 13, 1944, *B. Maguire & D. B. Fanshawe 23435.*

29. **Navia subpetiolata** L. B. Smith, sp. nov. Fig. 53.

Caulescens; foliis subpetiolatis, ad 26 cm longis, apice obscure serrulato excepto integris, juvenilibus obscurissime dissiteque lepidotis, mox glabris, vaginis triangularibus, 3–4 cm longis, ex sicco rubentibus, laminis lineari-lanceolatis, acuminatis, 14 mm latis, marginibus paulo incrassatis; inflorescentia in centro foliorum sessili, ellipsoidea, 30 mm longa, 15 mm diametro, verisimiliter simplici; bracteis ellipticis, obtusis, ca. 2 cm longis, sepala superantibus, integris, laevibus, rubris; sepalis oblongis, obtusis, 16 mm longis, tenuibus, basi 4–5 mm connatis; staminibus inclusis; ovario supero.

TYPE: leaves basally white with extreme bases green, frequent in cumbre at 2000 m alt., Serranía Parú, Río Parú, Caño Asísa, Río Ventuari, Amazonas, Venezuela, February 10, 1951, *R. S. Cowan & J. J. Wurdack 31368.*

30. **Navia caricifolia** L. B. Smith, sp. nov. Fig. 54.

Caulescens; caule erecto, simplici, 10–19 cm alto, foliorum vaginis vetustis inclusis 1 cm diametro; foliis juvenilibus terminalibus, strictis, ad 22 mm longis, glabris, vaginis ovatis, 2 cm longis, nervatis, brunneis, laminis linearibus, acuminatis, ad 19 cm longis, 3 mm latis, basi obscure serrulatis, involutis, basi albis sed haud angustatis; inflorescentiis terminalibus et pseudolateralibus, sessilibus, simplicibus, anguste ellipsoideis, 23 mm longis, glabris; bracteis florige-

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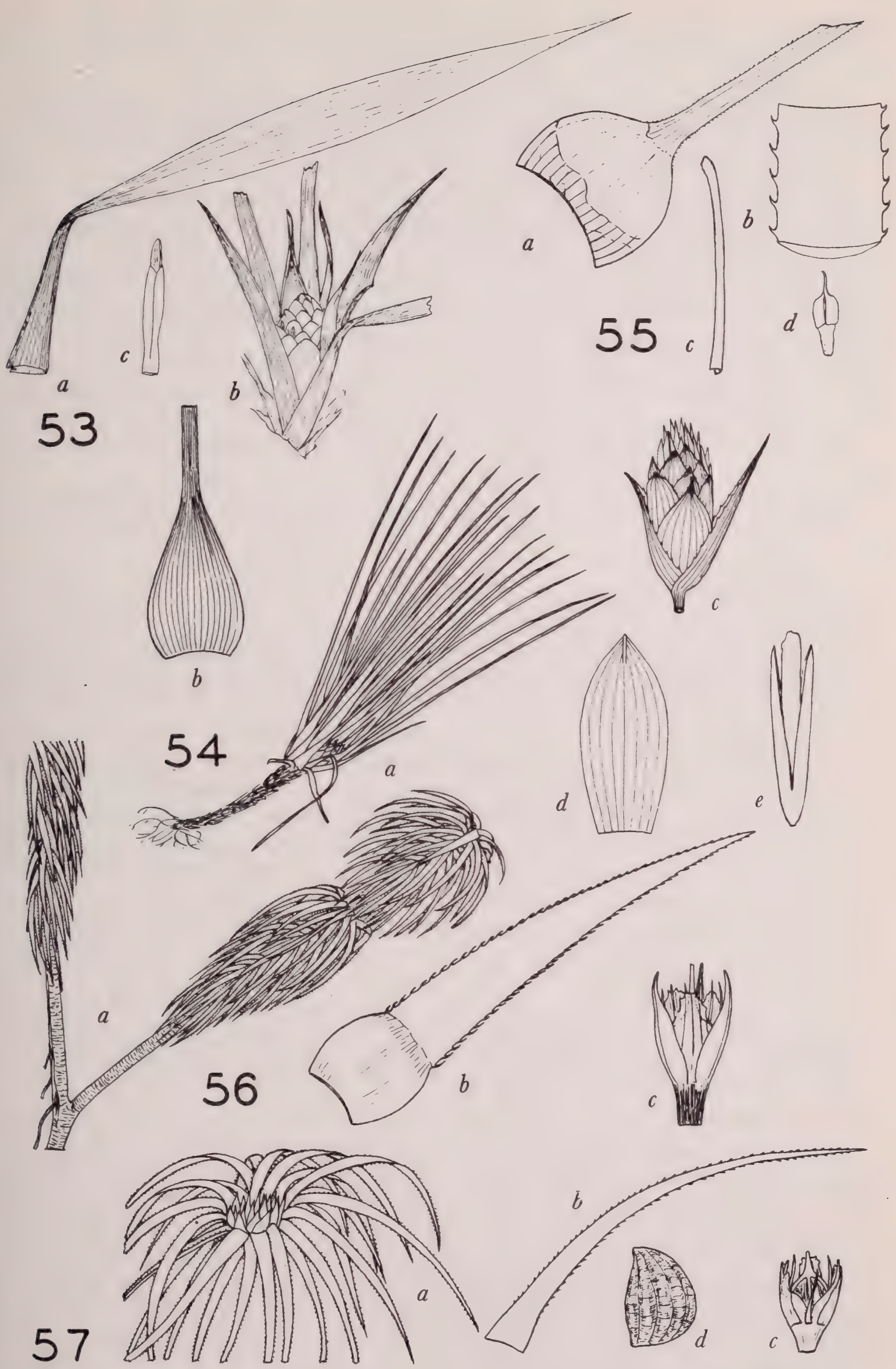
Explanation of figures 53–57

FIGS. 53–57. *Navia.* FIG. 53. *N. subpetiolata* (*Cowan & Wurdack 31368*). a, leaf, × ½; b, inflorescence, × ½; c, flower, × 1. FIG. 54. *N. caricifolia* (*Maguire & Maguire 35437*). a, habit, × ¼; b, base of leaf, × 1; c, inflorescence, × 1; d, floral bract, × 2; e, posterior sepals, × 2. FIG. 55. *N. immersa* (*Maguire, Cowan & Wurdack 30325*). a, base of leaf, × 1; b, part of leaf-blade, × 5; c, posterior sepal, × 1; d, pistil, × 1. FIG. 56. *N. aloifolia* (*Maguire, Wurdack & Bunting 37146*). a, habit, × ¼; b, leaf, × 1; c, old flower, × 2. FIG. 57. *N. parvula* (*Maguire, Wurdack & Bunting 37326*). a, habit, × 1; b, leaf, × 1; c, fruit, × 2; d, seed, × 10.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ris ellipticis, sepala subaequantibus, integris, apice subulato-incrassatis, alibi tenuibus; sepalis linearibus, acutis, 12 mm longis, posterioribus connatis, anguste alato-carinatis; petalis albis; ovario supero.

TYPE: abundant on dry rocks at 1500 m alt., Cerro Coro-Coro, Serranía Yutaje, Río Manapiare, Amazonas, Venezuela, March 2, 1953, *B. & C. K. Maguire 35437.*

Number *35496* from the same locality is also this species.

31. **Navia immersa** L. B. Smith, sp. nov. Fig. 55.

Verisimiliter humilis; caule ignoto; foliis plurimis, fere 2 dm longis, vaginis suborbicularibus, 15 mm longis, subhyalinis, glabris, laminis linearibus, acuminatis, basi 3 mm latis, minutissime subdenseque uncinato-serrulatis, crassis, coriaceis, supra glabris, subtus adpresse albo-lepidotis; inflorescentia sessili, in centro foliorum immersa, verisimiliter simplici; bracteis exterioribus e foliis gradatim reductis; bracteis florigeris linearibus, acutis, tenuibus, serrulatis, apice incrassatis; pedicellis brevibus; sepalis liberis, linearibus, acutis, 30 mm longis, apice paulo dilatatis serrulatisque, tenuibus, glabris; petalis staminibusque ignotis; ovario 6 mm longo, robusto, parte infera sterili; seminibus paucis.

TYPE: frequent on South Escarpment face at 1400 m alt., Cerro Huachamacari, Río Cunucunuma, Amazonas, Venezuela, December 18, 1950, *B. Maguire, R. S. Cowan & J. J. Wurdack 30325.*

32. **Navia aloifolia** L. B. Smith, sp. nov. Fig. 56.

Caulescens, saepe decumbens; caule simplici vel pauciramoso, 3–15 dm longo, ca. 7 mm diametro, in partibus apicalibus ad 3 dm longis foliis densissime vestito, alibi denudato; foliis, juvenilibus dissite arachnoideis, vaginis erectis, late ovatis, 1 cm longis, ex sicco albis, laminis recurvatis, anguste triangularibus, acuminatis, 6 cm longis, 9 mm latis, rigidis, pungentibus, utrinque viridibus, margine spinis gracilibus atris antrorsis 1.5 mm longis subdense armatis; scapo nullo; inflorescentiis sessilibus, celerrime ramis auctis sympodialiter superatis pseudo-axillaribus, dense globosis, paucifloris; bracteis florigeris subfoliaceis, flores superantibus; floribus subsessilibus; sepalis cochleari-imbricatis, acutis, 9 mm longis, posterioribus anguste alato-carinatis; petalis aureis; ovario plus quam ⅓ infero; seminibus nudis.

TYPE: common near Cumbre Camp, summit at 1700 m alt., Cerro de la Neblina, Río Yatua, Amazonas, Venezuela, January 10, 1954, *B. Maguire, J. J. Wurdack & G. S. Bunting 37146.*

Further numbers of this species from Cerro de Neblina are: *37020*, frequent along west escarpment edge; *37098*, abundant along escarpment west of Cumbre Camp; *37170*, dominant plant of open areas 4–8 km north of Cumbre Camp; and *37288*, forming cushions on west escarpment edge northwest of Cumbre Camp.

33. **Navia parvula** L. B. Smith, sp. nov. Fig. 57.

Pulvinata; caule brevi sed ramoso, 5 mm diametro; foliis multis, 2–5 cm longis, lepidibus linearibus albis dissite vestitis, mox glabris, vaginis late triangularibus, 7 mm longis, laminis recurvatis, linearibus, acuminatis, basi haud attenuatis, 3–4 mm latis, laxe serrulatis; inflorescentia nidulante, pauciflora, 7 mm diametro; bracteis exterioribus foliaceis sed reductis; bracteis florigeris e late ovato acuminatis, sepala superantibus, apice serrulatis; floribus subsessilibus; sepalis liberis, triangularibus, acutis, 7 mm longis; petalis staminibusque ignotis; ovario ½ infero; capsula subglobosa, rostro excepto 4 mm longa; seminibus paucis, nudis, nigris, tuberculato-sulcatis.

TYPE: locally frequent in colonies on dry rock outcrops on south side of Cumbre Camp caño toward Caño Grande at 1500–1700 m alt., Cerro de la Neblina, Río

Yatua, Amazonas, Venezuela, January 16, 1954, *B. Maguire, J. J. Wurdack & G. S. Bunting 37326*.

Vriesia sulcata L. B. Smith, sp. nov. Fig. 58.

Verisimiliter acaulis, florifera 6 dm alta; foliis 28 cm longis, vaginis late ellipticis sed quam laminis vix latioribus, 6 cm longis, lepidibus centro brunneis dense indutis, laminis anguste subtriangularibus, acuminatis, 3 cm latis, utrinque obscureque brunneo-punctulatis; scapo leviter curvato, 8 mm diametro; scapi bracteis strictis, dense imbricatis, infimis subfoliaceis, supremis ellipticis, apiculatis; inflorescentia simplicissima, 16-flora, oblonga, 20 cm longa, 5 cm lata, valde complanata; rhachi geniculata, excavata, dissite atro-punctulata; bracteis florigeris suberectis, internodiis subtriplo superantibus sed rhachin haud obtegentibus, ovatis, acutis, ad 5 cm longis, sepala bene superantibus, ecarinatis, ex sicco subchartaceis sulcatisque, obscure dissiteque atro-punctulatis; floribus per anthesin haud secunde versis; pedicellis crasse obconicis, 5 mm longis, sepalis lanceolatis, obtusis, 30 mm longis, 10 mm latis, ecarinatis, subchartaceis, dense brunneo-lepidotis; petalis ca. 4 cm longis, albis, basi ligulis binis acutis auctis.

TYPE: frequent on rocks in stream bed, right fork of Caño Yutaje at 1500 m alt., Cerro Yutaje, Serrania Yutaje, Río Manapiare, Amazonas, Venezuela, February 21, 1953, *B. & C. K. Maguire 35374*.

Apparently *Vriesia sulcata* is most nearly related to *V. chrysostachys* E. Morr., but its much larger bracts and flowers and its exposed geniculate rhachis make the differences much more obvious than the similarities. Since the type and only specimen is at anthesis, there is also the possibility of relation to some species where the flowers become secund later, such as *V. vexillata* L. B. Smith. This latter, however, has a lax inflorescence and sepals that exceed the floral bracts.

Vriesia fibrosa L. B. Smith, sp. nov. Fig. 59.

Florifera 5–6 dm alta; foliis multis, rosulatis, 3 dm longis, valde sulcato-nervatis et per aetatem in fibras longas atras persistentes divisis, utrinque lepides adpressas brunneas late scarioso-marginatas praeditis, vaginis ovatis, vix distinctis, laminis angustissime triangularibus, acuminatis, ca. 15 mm latis; scapo erecto, 5 mm diametro, glabro; scapi bracteis erectis, ellipticis, infimis angustissime laminatis, supremis quam internodiis brevioribus; inflorescentia laxe 6–7-flora, glabra; rhachi gracili, flexuosa; bracteis florigeris cum floribus secunde versis, late ovatis, obtusis apiculatisque, quam sepalis subduplo brevioribus, ecarinatis, tenuibus, nervatis; pedicellis 7 mm longis; floribus ante anthesin erectis dein secundo-patentibus; sepalis anguste ellipticis, obtusis, 25 mm longis, ecarinatis, ex sicco chartaceis, nervatis; petalis stamina superantibus, basi ligulis binis acutis auctis, laminis ellipticis, obtusis, 10 mm longis, extus rubescens, intus albo-virescens.

TYPE: terrestrial, frequent along open banks of Lower Caño Negro, 1400 m alt., Cerro Sipapo (Paráque), Amazonas, Venezuela, December 25, 1948, *B. Maguire & L. Politi 27912*.

Number *28108* collected in the same locality a few days later is the same species. It is noted as frequent on rocks in stream bed.

This species appears closely allied to *V. socialis* L. B. Smith, its floral bracts and sepals being almost identical in shape and texture although much smaller. Its scape and rhachis are more slender and a greater proportion of the scape-bracts exceed the internodes than in *V. socialis*. The most striking difference is in the leaves, judging from additional material of *V. socialis*, which has a broad, ligulate leaf-blade.

Guzmania nubicola L. B. Smith, sp. nov. Fig. 60.

Verisimiliter acaulis, florifera ca. metralis; foliis ad 64 cm longis, vaginis late ellipticis, dense brunneo-lepidotis, laminis ligulatis, acutis, 7 cm latis, pallido-lepidotis, supra glabratis; scapo fere recto, 15 mm diametro, glabro; scapi bracteis erectis, dense imbricatis et scapo omnino obtegentibus, supremis exceptis foliaceis maximisque; inflorescentia dense bipinnatim paniculata, subcylindrica, 32 cm longa; axi recto; bracteis primariis viridibus, concoloribus, infimis e suborbiculari late triangularibus, spicis superantibus supremis apiculatis, quam spicis brevioribus; spicis subsessilibus, dense globosis, 4 cm diametro, ca. 10-floris; bracteis florigeris latissime ellipticis, 15–20 mm longis, membranaceis, haud sulcatis, lepidotis; pedicellis robustis, 5 mm longis; sepalis lanceolatis, 19 mm longis, ad 4.5 mm connatis, per anthesin paulo exsertis, sulcatis, lepidotis; petalis aureis.

TYPE: inflorescence heads covered with gelatinous mucilage, buds greenish yellow, flowers yellow, on upper escarpment slopes east of Camp 3 at 1700 m alt., slope forest, Cerro de la Neblina, Río Yatua, Amazonas, Venezuela, December 24, 1953, *B. Maguire, J. J. Wurdack & G. S. Bunting 36852.*

From its nearest relative, *Guzmania mitis* L. B. Smith, this species is distinguished by its larger dimensions throughout, its ampler, thinner, even floral bracts, and narrower sepals.

Aechmea campanulata L. B. Smith, sp. nov. Fig. 61.

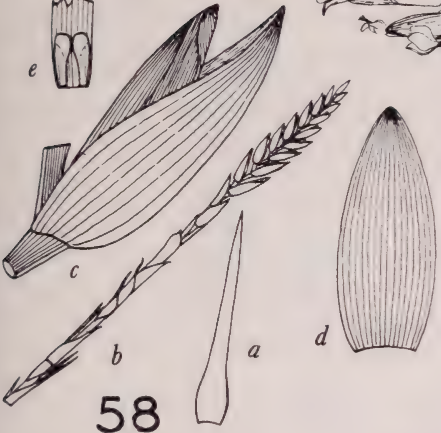
Terrestris, acaulis, stolonibus gracilibus procreans; foliis paucis, anguste rosulatis, exterioribus valde reductis, interioribus ad 37 cm longis, inflorescentiam fere aequantibus, dissite minuteque albo-lepidotis, vaginis ellipticis, magnis, laminis ligulatis, late acutis apiculatisque, basi contractis, ad 43 mm latis, laxe minuteque serratis; scapo leviter curvato, gracillimo, glabro; scapi bracteis erectis, anguste lanceolatis, membranaceis, glabris, rubris, supremis internodia superantibus; inflorescentia paupere bipinnata, laxissima, petalis inclusis 9 cm longa, glaberrima; bracteis primariis eis scapi similibus, quam ramis paulo brevioribus; ramis divergentibus, 1–2-floris, floribus inclusis ad 65 mm longis; bracteis florigeris minutis, quam pedicellis multo brevioribus, membranaceis, rubris; pedicellis gracilibus, 4–6 cm longis, ex sicco sulcatis; floribus albis (! Maguire); calyce campanulato, sepalis liberis, valde asymmetricis, oblique lateque obovatis, 13 mm longis, inermibus, submembranaceis; petalis 26 mm longis, alte callis binis auctis, laminis ellipticis; staminibus inclusis, filamentis serie secundae alte cum petalis connatis, pollinis granulis globosis, poris non visis; ovario crasse obconico, tubo epigyno brevi sed distincto, placentis apice loculorum affixis, ovulis caudatis.

TYPE: summit of Eagle Mountain at 700 m alt. (mile 114.5, Bartica-Potaro Road), Valley of the Mahdia River (Tributary Potaro River), Pakaraima Mountains, British Guiana, October 13, 1951, *B. Maguire 32098.*

This species would appear to belong to the subgenus *Lamprococcus*, in which it is immediately distinguishable by its campanulate calices.

Explanation of figure 58–62

FIGS. 58, 59, *Vriesia.* FIG. 58. *V. sulcata* (*Maguire & Maguire 35374*). a, leaf, × $\frac{1}{10}$; b, scape and inflorescence, × $\frac{1}{10}$; c, part of inflorescence, × 1; d, sepal, × 1; e, base of petal, × 1. FIG. 59. *V. fibrosa* (*Maguire & Politi 27912*). a, habit, × $\frac{1}{10}$; b, inflorescence, × $\frac{1}{2}$; c, sepal, × 1; d, base of petal, × 1. FIG. 60. *Guzmania nubicola* (*Maguire, Wurdack & Bunting 36852*). a, apex of leaf, × 1; b, section of inflorescence, × 1; c, sepals, × 1. FIGS. 61, 62. *Aechmea.* FIG. 61. *Ae. campanulata* (*Maguire 32098*). a, habit, × $\frac{1}{10}$; b, flower, × 1; c, sepal, × 1; d, petal, × 1; e, ovary, × 1. FIG. 62. *Ae. politii* (*Maguire & Politi 27373*). a, leaf, × $\frac{1}{10}$; b, part of inflorescence, × $\frac{1}{2}$; c, sepal, × 1; d, petal, × 1; e, ovary, × 1.



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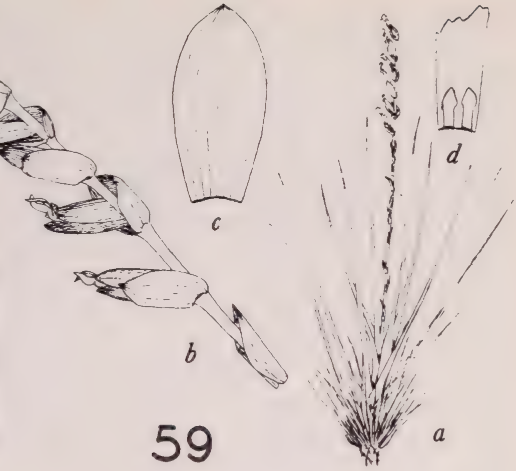

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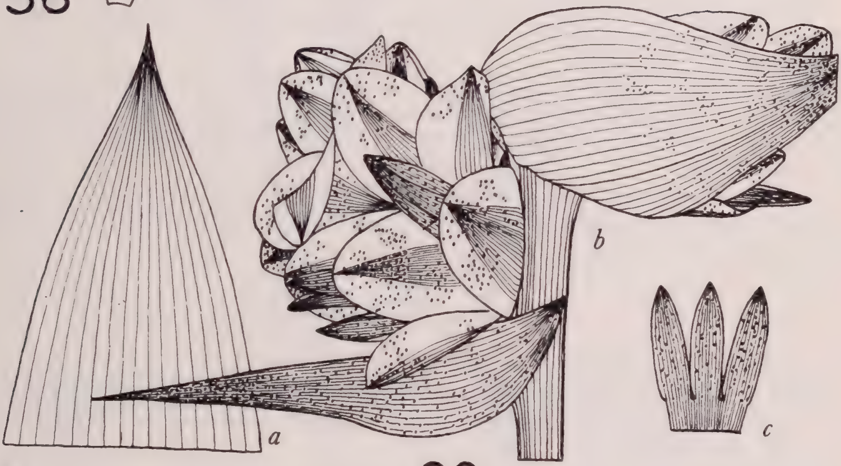

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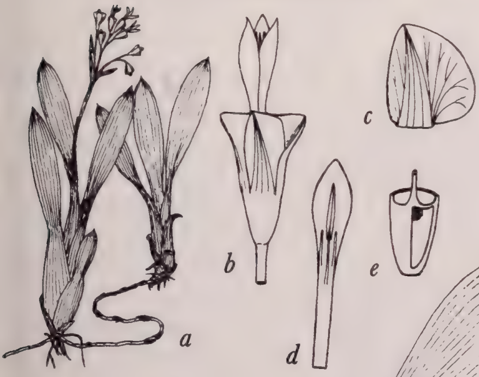

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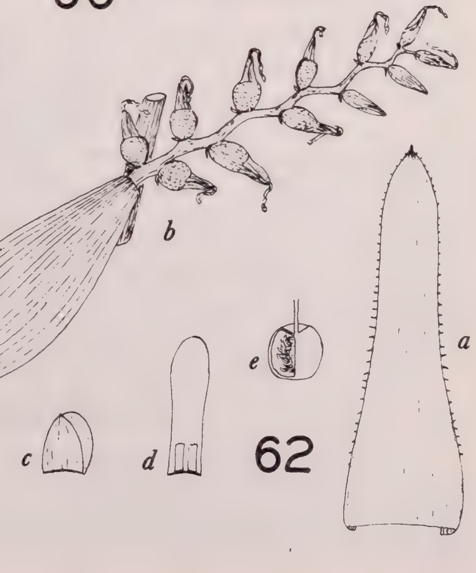

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Aechmea politii L. B. Smith, sp. nov. Fig. 62.

Florifera ultra 7 dm alta; foliis 7–10 dm longis, utrinque lepidibus adpressis pallidis vestitis, vaginis ellipticis, amplis, 25–30 cm longis, laminis ligulatis, late acutis vel rotundatis et cuspidato-apiculatis, 8–9 cm latis, planis, spinis latis planis ad 7 mm longis laxe armatis; scapo erecto, 7 mm diametro, albo-flocculoso, mox glabro; scapi bracteis erectis, ellipticis, acutis, quam internodiis multo brevioribus, integris, ex sicco chartaceis, rubris, albo-lepidotis; inflorescentia laxe bipinnatim paniculata, 3 dm longa, bracteis primariis exceptis mox glabra; bracteis primariis infimis eis scapi similibus sed majoribus, ad 11 cm, longis, deflexis, alteris valde abrupteque reductis, eis florigeris similibus; spicis divergentibus vel patentibus, basi brevissima nuda inclusa ad 8 cm longis, laxe 8–12-flora, rhachi gracili, geniculata; bracteis florigeris suborbicularibus, apiculatis, planis, minimis; floribus sessilibus, divergentibus; sepalis asymmetricis, ovatis, obtusis, brevissime mucronatis, 7 mm longis; petalis 15 mm longis, basi ligulis binis dentatis auctis; staminibus inclusis; ovario ellipsoideo, 5 mm longo, tubo epigyno brevi sed distincto, placentis centralibus, ovulis caudatis; bacca ex ovario valde incrassato.

TYPE: epiphyte, open rain forest, vicinity of Base Camp, 150 m alt., Cerro Sipapo (Paráque), Amazonas, Venezuela, November 24, 1948, *B. Maguire & L. Politi 27373.*

Number *28784* and its green phase, number *28785*, have had their inflorescences nearly ruined by some accident but there is enough left to indicate that they are this species. They are noted as terrestrial, frequent in mixed forest, Intermediate Camp at 650 m alt., Cerro Sipapo.

By its large broad coarsely toothed leaves *Aechmea politii* is quickly distinguished from the nearly related *Ae. schultesiana* Mez, and by its remote entire scape-bracts from *Ae. nivea* L. B. Smith.

HAEMADORACEAE

Pyrrorhiza Maguire & Wurdack, gen nov. (Fig. 63.)

Orbis exterioris stamina staminodiaque nulla. Orbis interioris staminum unicum staminodia duabus linearia. Stylus punctiformis; ovarium glabrum liberum; ovula pro loculo dua.

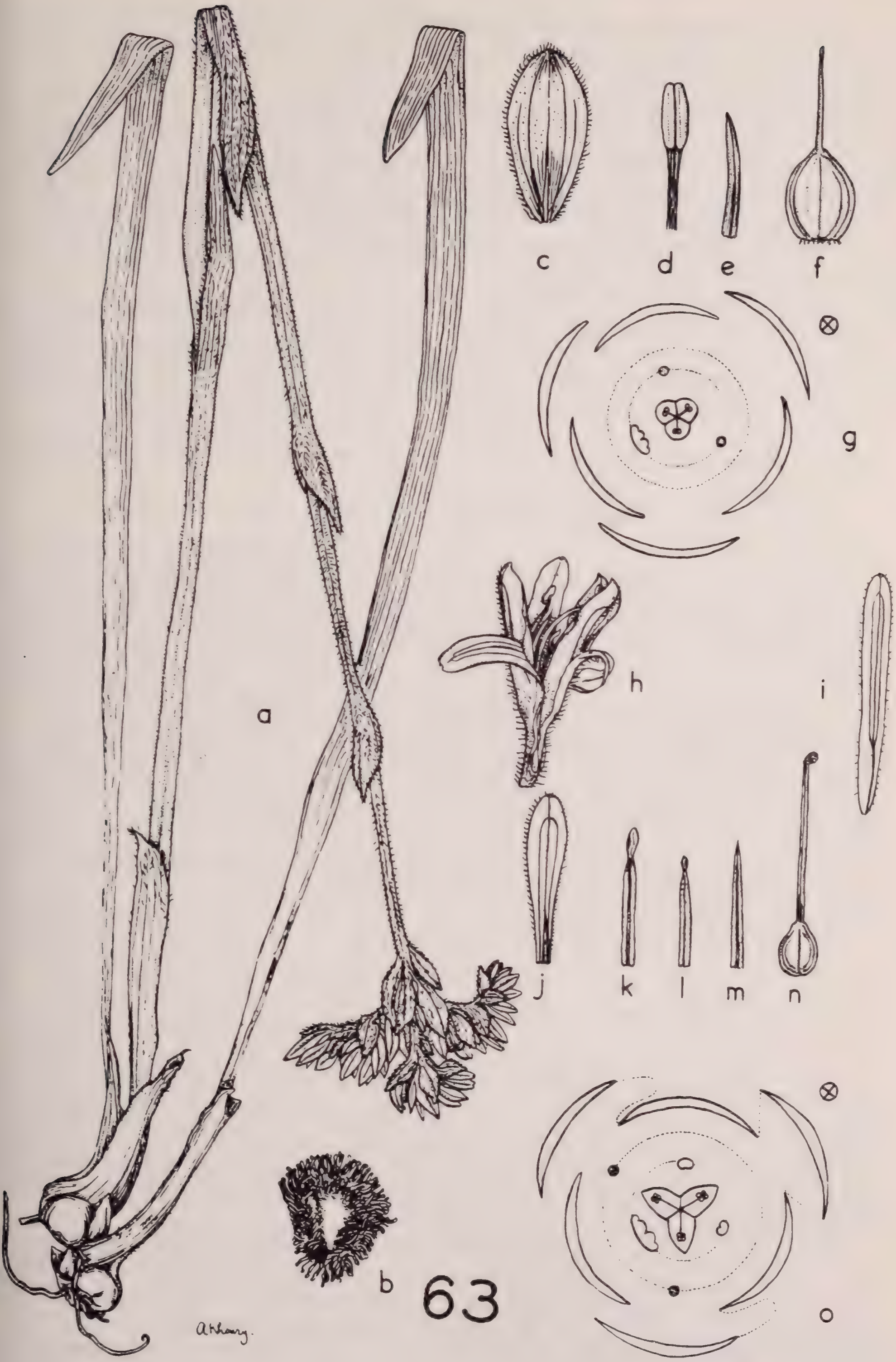
TYPUS: *Pyrrorhiza neblinae.*

Pyrrorhiza neblinae Maguire & Wurdack, sp. nov.

Herba cormifera unifoliata. Folium oblineare 30–36 × 0.8–1 cm carnosum glabrum, parte basali vaginante expansa 1–2 cm longa. Inflorescentia uniscaposa scapo basi bractea membranacea 3–5 cm longa vaginante bracteis superioribus 4 plusminusve coriacea vel carnosa 2–10 × 0.4–1 cm cum scapo crispo-pubescentibus setis subtilibus glanduliferis apicem versus densis. Inflorescentia planosuperata ramis helicoideis cum bracteolis dense glanduloso-villosis. Flores sessili vel breviter (ad 3 mm) pedicellati bracteolo unico suffulto, tepalis aequalibus 12.5–15 × 5.5–6 mm ellipticis obtusis vel late acutis trinervibus intus glabris extus modice vel sparse glanduloso-puberulis praecipue praeter medium, flore ceteroqui glabro. Stamini unici filamentum 3.5–4 mm longum crassum, anthera 3 × 1.1 mm biloculare longitudine dehiscente; staminodia linearia 1.7–2.7 × 0.2

Explanation of figure 63

FIG. 63. *a–g. Pyrrorhiza neblinae* Maguire & Wurdack: *a.* habit, × ¼; *b.* immature seed, × 2; *c.* tepal, × 1; *d.* fertile stamen, × 1½; *e.* staminode, × 5; *f.* pistil, × 1½; *g.* floral diagram. *h–o Schiekea orinocensis* (H.B.K.) Meissn.: *h.* flower, × 1½; *i–j.* tepals, × 3; *k.* large stamen, × 1½; *l.* small stamen, × 2½; *m.* staminode, × 1½; *n.* pistil, × 2½; *o.* floral diagram.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mm. Stylus 4.4–4.7 mm longus. Capsula 1.2–1.5 cm longa loculicida. Semen immaturum 3 × 2.5 mm complanatum marginibus processis corneis rubris ca. 1 mm longis dense vestitis.

HOLOTYPE: Herb with bright red-orange rootstalk, scape apically brown-orange, perianth basally orange-red and apically white, locally frequent in open savanna of west headland 5 km southwest of cumbre camp, Cerro de la Neblina, Terr. Amazonas, Venezuela, elev. 1900 m, Jan. 6, 1954, *Maguire, Wurdack, & Bunting 37108* (NY). Paratype: Rootstalk and inflorescence orange-red, perianth white basally orange, fruit orange-brown, occasional in savanna along west escarpment 1–3 km north of cumbre camp, Cerro de la Neblina, elev. 1800 m, Jan. 10, 1954, *Maguire, Wurdack, & Bunting 37222.*

The closest relative of *Pyrrorhiza* seems to be *Schiekia,* which differs in having much smaller flowers with a definitely zygomorphic perianth, one large and two small stamens in the inner cycle, two staminodia in the outer cycle, four (3–5 according to Pax) ovules per locule, a capitulate stigma, and smooth seeds.

Schiekia orinocensis (H.B.K.) Meissn. subsp. **savannarum** Maguire & Wurdack, subsp. nov.

Debilis (ad 40 cm altis) foliis pedunculi reductis, foliis basalibus 3–6 mm latis.

HOLOTYPE: Fls cream-white, the upper three tepals with basal orange streak, occasional in Savanna No. 1, northwest base of Cerro Yapacana, Terr. Amazonas, Venezuela, elev. 150 m, Dec 31, 1950, *Maguire, Cowan, & Wurdack 30496* (NY). Paratypes: Same locality, Nov. 20, 1953, *Maguire, Wurdack, & Bunting 36618;* Savanna No. 3, northwest base of Cerro Yapacana, elev. 150 m, Dec. 31, 1950, *Maguire, Cowan, & Wurdack 30471;* Sabana de Moyo on south bank of Río Ventuari 15 km above mouth, Terr. Amazonas, Venezuela, elev. 150 m, May 5, 1954, *J. S. Level 37.* BRITISH GUIANA: Sand Creek, Rupununi River, Sept., 1948, *Wilson-Browne 160;* Kwaimatta, Rupununi River, Oct. 1888, *Jenman 5164* and idem, Oct. 1889, *Jenman 5728.* Brazil: Río Caracarahy, Río Branco, Amazonas, 21–IX–1943, *Ducke 1320.*

Subsp. *orinocensis* has leaves 9–25 mm wide; the scape leaves show much less reduction; and the plant generally is much more robust.

Dr. Lourteig kindly forwarded from Paris a life-size sketch of *Humboldt & Bonpland 843* (*Wachendorfia orinocensis* H.B.K.), collected on Isla Pararuma, Río Orinoco, Estado Bolívar, Venezuela. Judging from this drawing, the type of the typical subspecies is rather intermediate between lax woodland forms and the savanna subspecies. However, it tends more toward the woodland collections. The following Terr. Amazonas, Venezuela, collections agree quite well with the Humboldt & Bonpland collection: *Maguire 29268,* from the Río Atabapo 15 km above San Fernando de Atabapo, Oct. 17, 1950, and *Steyermark 58439,* from rock outcrops below the mouth of the Río Sanariapo, Sept. 18, 1944. The Brazilian and British Guianan specimens cited under subsp. *savannarum* tend somewhat toward the typical subspecies; a more extreme tending is shown by *Tate 20* from Frechal, vicinity of Mt. Roraima, Sept. 6, 1927.

The woodland form with quite broad leaves is shown in such collections as *Spruce 2111* from San Gabriel da Cachoeira, Rio Negro, Brazil and the following Terr. Amazonas, Venezuela, specimens: *Maguire & Wurdack 34551* from the woodland between Savanna No. 3 and the gold mine camp, northwest base of Cerro Yapacana, elev. 150 m, Mar. 17, 1953, and *Maguire, Wurdack, & Bunting 37678* from scrub forest on Laja Pamoni, Río Casiquiare at mouth of Caño Pamoni, elev. 130 m, Feb. 12, 1954. Only two marked ecotypes seem involved in the species; unfortunately, the type specimen of the typical subspecies represents a slight aberration of the typical woodland form. Our field notes would indicate a difference in flower color between the extreme forms, the savanna subspecies having tepals basically white with orange stripes and the extreme woodland collections having solid orange tepals.

S. flavescens Maury (*S. congesta* Maury) was described and figured as having four staminodia and one anthered stamen. Unfortunately the type of this species could not be located at Paris. It may well be the same as *S. orinocensis* subsp. *savannarum*.

The flower structure of *S. orinocensis* needs clarification. Two of the outer tepals are united unilaterally to two of the inner adaxial tepals by flanges extending down the floral axis. In all collections examined, the outer whorl of stamens is represented by two linear staminodia; the inner whorl has one large (abaxial) stamen and two smaller-anthered (adaxial) stamens. In no case were fertile stamens observed in the outer whorl, although Pax (in E. & P. Nat. Pflanzenf. ed. 2. 15a: 390. 1930) implied occasional outer fertile stamens. The anthers of smaller inner stamens are somewhat caducous.

PIPERACEAE[8]

Piper fanshawei Yuncker, sp. nov.

Suffrutex glaber; foliis oblongo-ellipticis, apice acuminatis, basi inaequilateraliter acutis, fere totis vel quartum superum pinnatim venosis, nerviis utrinque 5 vel 6 sub margine laqueatis, petiolo a medio deorsum vaginato; bracteis lunato-truncatis dorso fimbriatis, drupa obovoidea apice puberula, stigmatibus parvis sessilibus.

Small, glabrous, nodose subshrub, 2 m tall, the upper internodes slender, 2–4 cm long. Leaves oblong-elliptic, acuminate, the base inequilateral, acute, one side about 2 mm shorter at the petiole, 3–4.5 cm wide and 10–14 cm long, pinnately nerved to the upper one-fourth or throughout, the nerves about 5 or 6 on each side, submarginally loop-connected, drying rather thin, translucent, very narrowly revolute, finely pellucid dotted, the petiole about 1 cm long, or occasionally to 2 cm, vaginate-winged below the middle. Spikes 4 mm thick and 2 cm long, apiculate, the peduncle 10–15 mm long, the bracts lunate-truncate, dorsally fringed, the fruits crowded, obovoid, velvety at the truncate-depressed apex, the stigmas small, sessile.

TYPE: BRITISH GUIANA: Pakaraima Mountains, Membaru-Kurupung Trail, occasional in *Cunuria* forest, alt. 1000 m, Oct. 29 - Nov. 4, 1951, *Bassett Maguire & D. B. Fanshawe 32356* (NY).

The glabrous twigs and leaves, type of venation, and especially the strongly velvety fruits distinguish this species. In leaf shape and size, this species bears some resemblance to *P. suratanum* Trel. & Yun. of Colombia but it differs strongly in its velvety rather than glabrous fruits and with the petioles scarcely vaginate to the middle. It resembles *P. riitosense* Trel. & Yun. from Aragua, Venezuela, in the size of the spikes. That species, however, has obpyramidal-trigonous glabrous fruits and longer leaves with 8–10 branches from each side of the midrib.

Piper striatifolium Yuncker, sp. nov.

Frutex [?], internodiis superis perconferte luteo-villosis; foliis anguste oblongo-ellipticis, apice attenuatis longe acuminatis, basim versus angustatis obtusis subcordulatisve a lamina media pinnatim venosis, nerviis utrinque 3 vel 4 subtus proeminentibus supra valde sulcatis, supra glabris subtus villosis, petiolo brevi conferte villoso ad basim vaginato; drupa truncato-obovoidea subtetragona glabra, stigmatibus sessilibus.

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[8] By T. G. Yuncker.

Shrub [?]; twigs slender, nodose, the upper internodes 1–2 cm long, very densely yellow-villous, the hairs up to 1mm or more long. Leaves narrowly oblong-elliptic or lance-oblong, with attenuately long-acuminate apex, the acumen 10–15 mm long, narrowing to the rounded, obtuse, or slightly cordulate base, one side 1–2 mm longer at the petiole, 2.5–3.5 cm wide and 14–16 cm long, pinnately nerved from the lower half, the nerves 3 or 4 on each side, strongly salient beneath and deeply impressed above, nearly straight and sub-parallel, with slender cross-connecting nervules, glabrous above, villous beneath, the nerves rather densely so, drying firm, opaque, revolute, the petiole scarcely 5 mm long, densely villous, vaginate at the base. Spikes 3 mm thick and 5–6 cm long, the peduncle about 1 cm long, villous, the bracts rounded-subpeltate, fringed, the drupe truncate-obovoid, subtetragonous, glabrous, glandular, the stigmas sessile.

TYPE: BRAZIL: Upper Rio Negro River, *Weiss & Schmidt* in 1907–08 (NY).

The densely villous stems, narrow leaves with impressed-salient nervation and comparatively short, stout spikes characterize this species. The impressed-salient nerves somewhat resemble those of *P. lineatum* R. & P. of Peru and Ecuador, but this species differs in the size and shape of its non-scabrid leaves and the character of the indument. In the shape of the leaves and the type of venation it resembles *P. jaboncillanum* Trel. & Yun. of Colombia. It differs, however, in its pubescence, fewer nerves, and shorter, straight spikes.

Piper politi Yuncker, sp. nov.

Frutex diffusus vel scandens, internodiis superis glabris vel juvenilibus plus minusve hispidis; foliis lanceolato-ovatis ad late ovata, apice acuminatis, basi rotundatis obtusis cordulatis vel cordatis, fere totis vel tertium superum pinnatim venosis nerviis utrinque 3–5 sub margine laqueatis, supra glabris subtus glabris vel ad venas plus minusve hispidis; petiolo ad basim vaginato; spicis adhuc immaturis, bracteis rotundato-subpeltatis margine conferte luteo-fimbriatis.

A nodose, trailing or scandent shrub, climbing to 15 m or more, the upper internodes comparatively short, glabrous to moderately or strongly hispid in young growth. Leaves lance-ovate to broadly ovate, the apex acuminate, the base equilateral or one side about 1 mm shorter at the petiole, rounded, obtuse, cordulate, or cordate, 2.5–4.5 cm wide and 5.5–8 cm long, pinnately nerved to the upper third or nearly throughout, the midrib prominent beneath, the lateral nerves 3–5 on each side, rather slender, submarginally loop-connected and with cross-connecting-anastomosing nervules, glabrous and glossy above, glabrous to sparingly or sometimes rather strongly hispid beneath along the nerves, drying coriaceous, opaque, revolute, the petiole mostly 5–10 mm long, glabrous to moderately hispid, vaginate at the base. Spikes as yet immature, as represented about 2.5 cm long, the peduncle 5 mm long, the bracts round-subpeltate, densely yellow-fringed.

TYPE: VENEZUELA: Bolívar: Cerro Guaiquinima, Río Paragua, locally frequent in dense "moss" woodland in deep narrow quebrada, "North" Valley, alt. 1600–1700 m, Jan. 4, 1952, *Bassett Maguire 32968* (NY).

VENEZUELA: Amazonas: Cerro Sipapo (Paráque), on mixed forest slopes above lower escarpment above Caño Grande, alt. 1500 m, Jan. 21, 1949, *Bassett Maguire & Louis Politi 28516* (NY). Bolívar: Chimantá Massif, Torono-tepuí, climbing attached to bluff base in sun, locally frequent, north-west-facing forested slopes between Summit Camp and base of escarpment, alt. 1880–1970 m, Feb. 27, 1955, stem dull green; lvs.

subcoriaceous, dull green above, paler dull green below, peduncle dull green; spikes ascending, greenish white, 4–6 mm diam., *Julian A. Steyermark & John J. Wurdack 1197* (F, NY); climbing on tree trunk, summit, along Caño Mojado, between base of upper falls and drop to escarpment, alt. 1895–1910 m, Feb. 23, 1955, lvs. chartaceous, dark green above, pale dull green below with impressed darker green veins, spikes erect, greenish white, 2.5 mm diam., *Julian A. Steyermark & John J Wurdack 1071* (F, NY).

The trailing or scandent habit of growth, leaf shape, type of indument, etc. characterize this species. There is no evidence that the ovaries or drupes would be stylose. The immature spikes make it impossible to determine with certainty its relationship with other species. It resembles *P. hostmannianum* (Miq.) C.DC. to a slight extent but differs in its smaller leaves, shorter [?] spikes, and type of indument.

Peperomia cladara Yuncker, sp. nov.

Herba carnosa stolonifera diffusa rupicola, ramis dissite hirsuta in sicco valde anguloso-sulcatis flavida desquamata ad nodos constricta. Foliis alternis vel raro oppositis pro more elliptico-suborbicularis apice rotundatis emarginatis basi obtusis palmatim 3-nerviis supra glabris subtus modice hirsutis, pilis erectis, petiolo crasso; spicis sat dissite florigeris, drupa aureo-flavida globosa rostrata, stigmate apicali.

A succulent, wide-spreading, rupicolous herb. Stem 2–3 mm thick, the branches ascending to 10–15 cm from the prostrate basal part, rooting at the lower nodes, drying yellow, scaly-exfoliating, strongly longitudinally grooved, deeply constricted and easily broken at the nodes, sparingly hirsute, the hairs erect, the internodes 5–10 mm long above to 3 cm below. Leaves alternate or infrequently opposite, elliptic, subobovate or mostly elliptical-suborbicular, the apex rounded, emarginate, the base obtuse, to 1.2–2 cm wide and 1.8–2 cm long, but often smaller. palmately 3-nerved, the midrib conspicuous, the lateral nerves more obscure, glabrous above, moderately hirsute beneath, the hairs erect, the apical notch usually somewhat bristly-hairy, drying coriaceous, wrinkled, revolute, glandular-pitted beneath, the petiole about 2 mm long, stout, constricted at the base, sparingly hirsute glabrescent. Spikes rather loosely flowered, 1–2 mm thick and 7–10 cm long, the peduncle rather slender, glabrous, 1-2 cm long, the bracts round-peltate, the drupes golden yellow, globose, beaked, about 1 mm long, with apical stigma.

TYPE: VENEZUELA: Bolívar: Cerro Guaiquinima, Río Paragua, occasional on moist rocks and cliffs near waterfalls, "North" Valley, alt. 1600–1700 m, Jan. 10–12, 1952, *Bassett Maguire 33047* (NY).

VENEZUELA: Bolívar: woodland floor at stream side, "North" Valley, alt. 1600–1700 m, Jan. 10–12, 1952, *Bassett Maguire 33072A* (NY). Amazonas: Caño Guaviarito, Río Manapiare, Río Ventuari, on rocks at summit of Cerro Guanay, alt. 1800 m, Feb. 4, 1951, *Bassett Maguire, Kathleen D. Phelps, Charles B. Hitchcock & Gerald Budowski 31748* (NY); Serranía Yutaje, Río Manapiare, Cerro, Coro-Coro, frequent on rocks, Mar. 2, 1953, *Bassett Maguire & Celia K. Maguire 35454* (NY); Cerro Yutaje, frequent on Northwest Ridge, Cerro Yutaje, alt. 1400 m, Feb. 11, 1953, *Bassett Maguire & Celia K. Maguire 35166* (NY).

P. cladara f. perglabra Yuncker, f. nov.

A speciei forma typica differt planta omnino glabra.

Plants entirely glabrous.

TYPE: VENEZUELA: Amazonas: Cerro Sipapo (Paráque), on rocks in north branch of Caño Profundo, frequent, alt. 1600 m, Jan. 8, 1949, *Bassett Maguire & Louis Politi 28253* (NY).

VENEZUELA: Amazonas: Serranía Yutaje, Río Manapiare, frequent on northwest ridge of Caño Yutaje, alt. 1500 m, Mar. 1, 1953, *Bassett Maguire & Celia K. Maguire 35421* (NY).

P. cladara f. ciliata Yuncker, f. nov.

A speciei forma typica differt foliis ciliolatis.

Leaves bristly ciliolate, but otherwise glabrous.

TYPE: VENEZUELA: Amazonas: Cerro Huachamacari, Río Cunucunuma, infrequent on cliff face in dense valley woodland between Summit Camp and savanna on "East" Ridge, alt. 1800 m, Dec. 8, 1950, *Bassett Maguire, R. S. Cowan & John J. Wurdack 30041 (NY).*

The constricted stems render the dry specimens very brittle and easily broken. The leaf shape and arrangement, and easily fragmented stems are distinctive characters of this species. It belongs in the subgenus *Micropiper* which includes only a small number of alternate-leaved species. *P. purpurinervis* C.DC. from Mt. Roraima, also a *Micropiper* with alternate leaves, differs in its leaf shape, minutely puberulent parts, and shorter spikes.

Peperomia celiae Yuncker, sp. nov.

Herba carnosa diffusa; caule glabro vel juvenili dissite crispo-pubescenti; foliis alternis rotundato-ovatis, apice obtusis vel subacutis, basi rotundatis cordulatis subpeltatis, conferte ciliolatis palmatim 5–7 nerviis, petiolo leviter pubescenti; spicis terminalibus atque [?] axillaribus, pedunculo glabro, drupa oblongo-cylindrica apice obliquo-scutelliformi, stigmate centrali.

A succulent, spreading herb. Stem glabrous, or slightly crisp-pubescent when very young, 2–3 mm thick when dry, drying glossy and with exfoliating epidermis, the internodes mostly 1–3 cm long. Leaves alternate, round-ovate, with rounded, obtuse, or acutish apex, the base rounded, cordulate, slightly peltate, variable in size, 1.5–3.5 cm wide and 1.5–4 cm long, glabrous above, sparsely crisp-pubescent glabrescent beneath, strongly finely ciliate throughout, the ciliation extending onto the petiole as two hairy lines, palmately 5- or faintly 7-nerved, the innermost pair of lateral nerves approximating the midrib in the lowermost 2–3 mm, the midrib and main lateral nerves finely branched upward and submarginally loop-connected, drying firm, glossy, dark, translucent, the petiole 5–10 or sometimes 20 cm long, sparingly crisp-pubescent. Spikes terminal and [?] axillary, about 2 mm thick and 10–12 cm long, the peduncle to 1 cm long, glabrous, the bracts round-peltate, the drupe oblong-cylindrical, thickening slightly toward the truncate base, about 2 mm long, with obliquely scutelliform apex and central stigma.

TYPE: VENEZUELA: Amazonas: Serranía Yutaje, Río Manapiare, rare on northwest ridge of Caño Yutaje, alt. 1500 m, Mar. 1, 1953, *Bassett Maguire & Celia K. Maguire 35422* (NY).

This species belongs in the group of species (*Rhynchophorum*) having fruit with a scutelliform apex. It differs from all known species in its broadly ovate, cordulate, densely ciliated leaves. It is named for Celia K. Maguire, one of the collectors of the type specimen.

Peperomia gracilipeduncula Yuncker, sp. nov

Herba epiphytica sat parva glabra; foliis alternis ellipticis vel elliptico-oblanceolatis, apice abrupte acuminatis, basi cuneatis, septuplinerviis apice ciliolatis; petiolo canaliculato decurrenti-amplectenti; spicis terminalibus axillaribusque, ovario apice obliquo truncato, stigmate subapicali, drupa immatura.

A comparatively small, glabrous, herbaceous epiphyte, the stems 1.5 mm thick near the base when dry, ascending from a decumbent rooting base to about 10 cm high, the internodes to 1 cm long or occasionally 2 cm. ridged by the decurrent petiole margins. Leaves alternate, elliptic or elliptic-oblanceolate, the apex bluntly pointed, the base cuneate, 1.5–3.2 cm wide and 3.5–8 cm long, or some lower leaves with scarcely pointed apex and smaller, septuplinerved, the outermost pair of lateral nerves very slender and inconspicuous, the innermost pair coalescing with the midrib within the lowermost 10 mm, with numerous slender, cross-connecting-anastomosing nervules as viewed by transmitted light, ciliolate about the apex, drying rather firm translucent, the petiole 5–8 mm long, canaliculate, clasping-decurrent. Spikes terminal and axillary, up to 6 cm long and 2 mm thick, moderately flowered, the peduncle slender, to 3 cm or more long, the bracts round-peltate, the ovary ovoid [?], the apex oblique, the stigma subapical, the drupe as yet immature.

TYPE: VENEZUELA: Yaracuy: Sierra de Aroa, June 7, 1953, *L. Aristeguieta & F. Pannier 1958* (NY).

This species appears to be near *P. diruptorum* Trel. of Panama from which it differs in its much longer peduncles and larger, 7-plinerved leaves. In *P. diruptorum* the bracts on young spikes are very crowded and overlap shingle-like. In this species the bracts on spikes of comparable age scarcely are in contact and show no overlapping.

Peperomia venusta Yuncker, sp. nov.

Herba glabra; ramis caulis adscendentibus; foliis alternis lanceolato-ovatis 5–10 mm e margine peltatis, apice obtuse acutis, basi rotundatis palmatim 7–9-nerviis eciliatis; spicis terminalibus [?] axillaribusque, ovario obovoideo apice obliquo, stigmatibus subapicalibus, drupa haud matura.

A glabrous herb. Stem decumbent and rooting at the lower nodes, the branches ascending to 10 cm or more, 1–3 mm thick at the base when dry, the internodes about 2 cm long above, lengthening to 10 cm or more downward. Leaves alternate, lance-ovate, gradually narrowed to the blunt apex, peltate 5–10 mm above the rounded base, the lower leaves 3–4 cm wide and 7–8 cm long, much reduced upward, palmately 7–9-nerved, the nerves conspicuous beneath, obscurely branched upward, the innermost two pairs of lateral nerves gently curving and continuing to the apex, drying rather thin, translucent, glandular-dotted beneath, ciliolation lacking, the petiole up to 8 cm long on lower leaves, scarcely 1 cm long on smaller upper leaves. Spikes terminal and [?] axillary, 2 mm thick and 2–4 cm long, the peduncle to 3 cm long, the bracts round-peltate, glandular-dotted, the ovary obovoid with oblique apex and subapical stigma, mature fruit not seen.

TYPE: VENEZUELA: Amazonas: Cerro Marahuaca, slope rainforest, alt. 1000 m, May 3, 1949, *Bassett Maguire & Bassett Maguire, Jr. 29187A* (NY).

The lance-ovate, bluntly pointed and round-based peltate leaves are distinctive of this attractive species. It apparently bears some resemblance to *P. schenkiana* Dahlst. of Santa Catharina but differs in its proportionately longer leaves with rounded rather than cordate base.

ANNONACEAE[9]

Annona trunciflora R.E.Fr., sp. nov.

Arbor ca. 7 m alta; ramuli novelli rubescentes, pilis ± adpressis rubro-ferrugineis vestiti; internodia 1.5–2 cm longa. Petiolus 0.6–1 cm longus, supra canaliculatus; lamina rigide coriacea, exsiccata supra nigrescens et lucida, subtus olivacea, oblanceolato-obovata, basin versus cuneato-acutata et decurrens, apice breviter acutata et cuspide 0.5–1 cm longa instructa, 8–12 cm longa et 3–4 cm lata; costa supra impressa, subtus valde prominens rugosa; nervi laterales I. utrinque 7–9, supra paulo impressi, subtus elevati, 2–3 mm intra marginem

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[9] By R. E. Fries.

arcuato-conjuncti; reticulum venularum praecipue subtus impressum. Flores e trunco exeuntes; pedicelli recti, rigidi, ca. 3 cm longi et 2–3 mm crassi, apicem versus paulo incrassati, dense ferrugineo-tomentelli, prope basin articulati. Sepala in discum integrum 10–12 mm latum coalita, extus dense ferrugineo-tomentella, intus glabra. Petala exteriora valvata, crassa, rigida, ovata, acutiuscula, extus densissime sericea, intus breviter tomentella, 3–3.5 cm longa et 2–2.5 cm lata; petala interiora marginibus tenuibus imbricata, exterioribus ± aequilonga, utroque latere breviter densissime cinereo-tomentella. Stamina numerosissima, filamento 1–1.5 mm longo incluso 4–4.5 mm longa; connectivi appendice truncato-semiglobosa minute papillosa; pollinis grana miniata. Ovaria numerosa, sub anthesi non coalita, linearia, ca. 3 mm longa, dense ferruginea-sericea, stigmate minuto acuto glabro. (Fructus ignotus.)

TYPE: VENEZUELA: Estado Bolívar, occasional in forest at Raudal Maraca (about 110 river km from mouth), Río Parguaza, elev. 115 m, Dec. 31, 1955, *J. J. Wurdack & J. V. Monachino 41044.* (NY).

Unfortunately the material of this species is incomplete, as fruits are missing. However the flower material is rich and it shows that the type belongs to the genus *Annona.* According to the revision of the sections of *Annona,* published by the author in Acta Horti Bergiani 10: 198 (1931) this new species must be placed in section *Eu-Annona,* even if the pocket-shaped pits in the nerve angles on the back side are very small. In the vegetative parts the new species agrees also rather much with the section *Psammogenia,* especially in the impressed network of the veins. However, the imbricate aestivation of the inner petals does not agree with the valvate inner petals of *Psammogenia.* The most remarkable character for the new species is the cauliflory, with the flowers situated on the stem.

Duguetia venezuelana R.E.Fr., sp. nov.

Frutex 9.3–1 m altus vel arbuscula ad 4 m alta; ramuli densissime aureo-lepidota. Petiolus 2–5 mm longus; lamina rigida, supra ab initio omnino glabra et laevis, subtus lepidibus stellatis argenteis et margine tantum fimbriatis densissime vestita, ovalia, basi brevissime acuta, apice rotundata vel breviter acutata vel interdum minute emarginata, 4–6 cm longa et 2–3 cm lata; costa subtus elevata. Pedunculi breves (ca. 5 mm longi), bractea minuta instructi. Sepala fere libera, ovata, acutiuscula, extus densissime lepidota, intus pilis stellatis tomentella sed basin versus glabra, ca. 1.5 cm longa et 1–1.5 cm lata. Petala extus densissime stellato-lepidota, intus glabra sed apicem versus pilis stellatis tomentella, exteriora rhombeo-spathulata ca. 2.5 cm longa et 1.5 cm lata, interiora paulo angustiora, oblongo-spathulata, ad 3 cm longa et 1 cm lata. Stamina 1.5–2 mm longa, connectivi appendice globosa, brevissime setulosa. (Fructus ignotus.)

TYPE: VENEZUELA: Alto Río Orinoco, Territorio Amazonas; locally occasional in tree "islands" in Savanna No. 3, northwest base of Cerro Yapacana, elev. 150 m, Mar. 17,1953, *Bassett Maguire & John J. Wurdack 34565* (Herb. Mus. Holm.).

Because the inner petals are narrower than the outer, this species ought to be placed in section *Heteropetalum.* However, it recalls in its habit section *Eu-Duguetia* (*D. furfuracea* and others) and it would perhaps be better to refer it to that section. *D. venezuelana* is distinguished by the small, elliptic leaves, which are rounded at the apex and quite glabrous above from the first.

Duguetia dimorphopetala R.E.Fr., sp. nov.

Frutex 1 m altus, ramuli novelli dense stellato-lepidoti. Petiolus crassus, 3–8 mm longus; lamina rigida, discolor, supra ab initio glabra, subtus primo dense, demum laxe lepidibus margine fimbriatis vestita, ovato-oblonga, ca. ad medium latissima, basi et apice breviter acuta, interdum cuspide brevi obtusiuscula instructa, 8–12 cm longa et 2–4 cm lata; costa supra paulo impressa, subtus valde elevata; nervi laterales tenues, utrinque 12–18, angulo fere 90° exeuntes, ca. 2 mm intra marginem arcuatim conjuncti. Flores solitarii; pedicelli curvati, ca. 8 mm longi, prope basin bractea amplectente ca. 2 mm longa instructi. Sepala libera, membranacea, acuta, ovata, extus densissime stellato-lepidota, intus cinereo-tomentella et basin versus glabra, 1.5 cm longa et 1–1.2 cm lata. Petala extus densissime argenteo-lepidota, intus sursum pilis stellatis tomentosis ceterumque glabra, exteriora ovata obtusa ca. 3 cm longa et 1.2 cm lata, interiora conspicue angustiora, lineari-oblonga, acuta, 3 cm longa et 0.6 cm lata. Fructus globosus, ca. 2 cm diam.; carpidia basin versus glabra, apice pyramidata acuta et cinereo-lutescenti-tomentella.

TYPE: VENEZUELA: Rio Guainía, in sabanita 1 km east of Maroa, elev. 125 m, April. 16, 1953, *Bassett Maguire & John J. Wurdack 35683* (NY).

The narrow inner petals place this species in section *Heteropetalum* R.E.Fr., where it is most closely related to *D. venezuelana*. From this it differs by the larger, basally acute leaves and by the narrower inner petals.

Duguetia tenuis R.E.Fr., sp. nov.

Arbor; ramuli tenues flexiles, juniores pilis stellatis patentibus instructi. Petiolus 1–2 mm longus; lamina membranacea, concolor, supra laevis et costa stellato-hirsuta glabrescenti excepta glaberrima, subtus primo pilis stellatis flavescentibus hirsuta, mox fere omnino glabra, lanceolata vel anguste obovata, ad medium vel paulo supra medium latissima, basin versus angustata, ima basi paulo inaequilateralis, uno latere acuto, altero plus minus obtuso, apice in cuspidem 1–1.5 cm longam et vulgo obtusam sat sensim contracta, (6–) 8–9 cm longa et 1.5–3 cm lata; costa supra impressa, subtus prominens; nervi laterales tenues, supra parum conspicui, subtus prominuli et reticulum laxum formantes. Sepala extus incano-tomentella, ovata, 15 mm longa et ca. 8 mm lata. Petala ca. 12 mm longa et 8 mm lata, exteriora ovata acuta, interiora oblonga. Stamina 2 mm longa, connectivi appendice conico-acuminata. Fructus (immaturus) 1 cm diam.; monocarpia glaberrima, in acumen longum subito contracta.

TYPE: BRITISH GUIANA: Issinoru Creek, Maz. R., in Morabucoa forest on red lateritic soil, March 4, 1949, Forest Department Field No. F 2860 (Record No. 6007), (NY).

Duguetia tenuis belongs to section *Alcmene* and is closely related to *D. neglecta* Sandw. It differs from this by smaller and comparatively narrower leaves with less marked cusp and less rounded base. The flowers seem to be smaller but perhaps are not fully developed on the material available.

Ephedranthus fragrans R.E.Fr., sp. nov.

Arbor ca. 15 m alta; ramuli novelli glabri, vetustiores cinereo-corticati; internodia 1.5–2 cm longa. Petiolus 8–12 mm longus, glaber et nigrescens, sursum canaliculatus; lamina membranaceo-chartacea, ab initio glaberrima, elliptica, ad medium latissima, basi acuta et conspicue decurrens, apice in cuspidem obtusam ca. 1.5 cm longam contracta, 12–14 cm longa et 5–6 cm lata; costa utrinque elevata; nervi laterales angulo acuto exeuntes, sursum curvati; reticulum venularum densum, utrinque prominulum. Flores (masculi solum obvii) albidi, fragrantes, ex axillis foliorum delapsorum exeuntes, solitarii vel pauci; pedicelli rigidi, 5–8 mm longi, ut sepala petalaque brevissime cinereo-sericei, bracteis nunnullis (ca. 3) infra medium instructi. Sepala reniformia, 1.5–2 mm longa, 3 mm lata. Petala tenuia, ovato-oblonga, apice rotundata, 10–15 mm longa, interiora paulo angustiora. Torus conicus, acutus, 2.5 mm altus. Stamina 2-2.5 mm longa. Carpella in floribus masculis desunt.

TYPE: VENEZUELA: Río Negro, occasional on lower slopes of Piedra Nunca (just north of Piedra Cucuy), elev. 100-150 m, Apr. 10, 1953, *Bassett Maguire & John J. Wurdack 34954* (Herb. Mus. Holm.).

This new species belongs to section *Eu-Ephedranthus* R.E.Fr. though the hairs on the flowers are remarkably short. It is especially characterized by the quite glabrous young shoots and leaves and by the conical acute torus. Moreover the leaves are acute at the base and distinctly decurrent.

Guatteria robusta R.E.Fr., sp. nov.

Arbor ramulis novellis tomentosis pilis patentibus ferrugineis densissime vestitis. Folia fere sessilia; lamina rigida, discolor, supra obscure viridis, subtus ferruginea, utrinque densissime verruculosa, supra ab initio glaberrima, subtus pilis longis patentibus instructa, obovata, basin versus longe sensimque angustata, apice in cuspidem ca. 1 cm longam contracta, ca. 25 cm longa et 12 cm lata; costa supra valde impressa, subtus cylindrico-prominens; nervi laterales utrinque 20-25, validi, supra valde impressi, sub angulo fere 90° exeuntes, pulchre paralleli, ca. 4 mm intra marginem arcubus curvatis conjuncti. (Flores ignoti.) Monocarpia ellipsoidea, apice rotundata, basin versus in stipitem 4-5 mm longum subito contracta, exsiccata nigra, rugulosa, 13-16 mm longa et 9-10 mm diam. Semen nigrum, nitidum, striato-rugosum, hilum ca. 2 mm latum.

TYPE: BRAZIL: Amazonas: São Paulo de Olivenca, with fruits, Apr. 1945, *R. de Lemos Fróes 20788* (NY).

Vernacular name: "Envira da mata."

This species belongs to section *Mecocarpus* and is most nearly related to *G. microcalyx* R.E.Fr. From this it differs by the patent hairs on the lower surface of the leaves, and by the very dense ferruginous indument on the young shoots and and nerves. The short, elliptic monocarps are also characteristic of the species.

Guatteria maguirei R. E.Fr., sp. nov.

Frutex vel arbor 4-6 m alta, dense ramosa; ramuli novelli exsiccati nigricantes, pilis laxis instructi sed mox glabrescentes. Folia rigida, exsiccata olivacea, subtus paulo pallidiora; petiolus 2-4 mm longa, supra leviter canaliculata; lamina supra glaberrima et lucida, subtus pilis longis patulis nonnullis instructa, mox glabrescens, ovata, basi rotundata vel interdum brevissime acuta, apicem versus longe caudato-acutata, 4-8 cm longa et 1.5-3 cm lata; costa supra basin versus paulo impressa, subtus valde elevata; nervi laterales angulo ca. 80° exeuntes, reticulum densum formantes. Flores solitarii; pedicelli tenues, primo pilis pallidis sparsis patulis instructi, mox glabri, 10-17 mm longi, ca. 4 mm supra basin articulati, fructiferi ad 30-35 mm elongati. Sepala rotundaro-ovata, ca. 3 mm longa et lata, extus sericea. Petala oblonga, apice obtusiuscula marginibus vulgo reflexis extus basin versus ferrugineo-sericea. Monocarpia numerosa, ellipsoidea, basi et apice breviter acuta, glabra sed minute rugosa, castanea 8-9 mm longa et 4-6 mm lata, stipitibus 1.5-2 mm longis sustenta.

TYPE: GUIANA: Cerro Yutaje, Río Manapiare, Territorio Amazonas, occasional along left fork of Cano Yutaje, elev. 1250 m, Febr. 12, 1953, *Bassett Maguire & Celia K. Maguire 35231*, with fruits (Herb. Mus. Holm.).

VENEZUELA: Río Guainía, in Sabana El Venado on left bank of Caño Pimichín near Pimichín, elev. 140m, April 14, 1953, *Bassett Maguire & John J. Wurdack 35657*, with flowers.

This species belongs to section *Cephalocarpus* R.E.Fr. and is closely related to *Guatteria venezuelana* R.E.Fr. From this the new species differs in the shape

of the leaves, which are rounded at the base and more gradually narrowed towards the tip, and by the ellipsoidal, distinctly stipitate monocarps. It also lacks the dense ferruginous hairs which cover the young shoots and the leaves of *G. venezuelana.*

Guatteria stenopetala R.E.Fr., sp. nov.

Arbor ca. 8 m alta. Ramuli novelli pilis erecto-patentibus brevibus vestiti, mox glabrescentes et nigricantes. Petiolus 4–6 mm longus; lamina rigida, late ovata, basi rotundato-acuta et in petiolum brevissime decurrens, apice in cuspidem 5–10 mm longum obtusum contracta, 5–8 (–10) cm longa et 3–5 cm lata, utroque latere glabra; costa supra in foliis junioribus pilis brevibus patulis obsita, mox glabrescens, subtus rubescens et primo breviter sericea, demum glaberrima; reticulum venularum densum, utroque latere prominens. Flores in axillis foliorum solitarii; pedunculi graciles erecti, 3–3.5 cm longi, pilis brevibus ferrugineis adpressis vel paulo patulis vestiti, basi et ad medium bractea minuta instructi. Flores parvi. Sepala rotundato-ovata, acuta, extus ferrugineo-sericea, intus glabra, mox recurvata, ca. 3 mm longa. Petala erecta, omnia lineari-oblonga, obtusa, extus basin versus ferrugineo-sericea, apicem versus cinereo-tomentella, 7–8 mm longa et ca. 3 mm lata. Stamina 1 mm longa, disco connectivi plano breviter set conspicue setuloso. Pedunculus fructifer gracilis, rigidus, 3.5 cm longus. Monocarpia ovoidea, glabra et nitida, basi breviter acutata, apice rotundata et brevissime apiculata, ca. 10 mm longa et 5 mm diam., stipitibus 13–15 mm longis sustenta.

TYPE: VENEZUELA: Territorio de Amazonas; Cerro de la Neblina, Río Yatua, in *Clusia* "moss-forest" elev. 650 m, Dec. 29, 1953, *Bassett Maguire, John J. Wurdack & George S. Bunting 36970* (NY).

This very characteristic species agrees most closely with *Guatteria trichostemon* R.E.Fr. in having upright flowers with long peduncles and oblong petals. This new species has markedly narrower petals of uniform width, tapering gradually upwards. The hairiness of its leaves is also somewhat reminiscent of *G. trichostemon* in that the median nerves are at first hairy on the upper sides of the leaves, but soon become glabrous. *G. trichostemon* is the only so far known species of the *Trichostemon* section in which the median nerves are persistently pilose on their upper sides. The difference between the two species compared here is most marked in the shape of their leaves, which in *G. stenopetala* is broadly oval, 4–5 cm broad, and in *G. trichostemon* oblong-lanceolate, 1.5–2 (–2.5) cm broad.

Unonopsis rigida R.E.Fr., sp. nov.

Frutex 5 m altus, Petiolus niger, crassus, glaber, supra planus, 2–3 mm longus; lamina rigide chartacea, utrinque glaberrima, haud verrucosa, elliptica vel elliptico-obovata, basin versus interdum paulo angustata, ima basi late rotundata non decurrens apice rotundata et abrupte cuspidata, (12–) 18–27 cm longa et 5–11 cm lata; costa utroque latere prominens, nervi laterales I. utrinque 14–15, arcuato-adscendentes, 4–6 mm intra marginem conjuncti; reticulum venularum supra planum et vix conspicuum, subtus paulo prominens. Inflorescentiae e ramulis efoliosis exeuntes; pedicelli florum ca. 2.5 cm longi, tenues, brevissime et laxiuscule rufo-sericei. Sepala semiorbicularia, ca. 1 mm longa. Petala 12–14 mm longa et 9–10 mm lata, exteriora sericea, interiora praeter partem inter exteriora expositam tomentellam glabra. Stamina 1.5 mm longa, connectivi appendice setulosa. Ovaria dense ferrugineo-hirsuta. (Fructus ignotus.)

TYPE: BRAZIL: Estado da Amazonas, Rio Negro, Porto Curucuhy, terreno arenoso, with flowers, Oct. 6, 1945, *Ricardo de Lemos Froes 21110.* (NY).

Unonopsis rigida is closely allied to *U. stipitata* Diels and like that species is characterized by large rigid leaves and by the occurrence of hairs on the connective shields. However, it differs conspicuously in the form of the leaves, which are rounded at the base, not cuneate, by very short and thick petioles, and by thinner and less hairy peduncles.

Anaxagorea gigantophylla R.E.Fr., sp nov.

Arbor ad 12 m alta, ramulis novellis crassis densissime breviterque ferrugineo-tomentosis; internodia ca. 4 cm longa. Petiolus crassus (7–10 mm diam.) sicut ramuli ferrugineo-tomentosus; lamina gigantea, 60–70 cm longa et 20–27 cm lata, rigide membranacea, exsiccata subtus olivacea et pilis stellatis minutis ferrugineis mox evanidis instructa, ovata, basi rotundata et ima basi obliqua, apicem versus sensim angustata et acuta vel ca. 2 cm longe cuspidata; costa supra impressa et glabra, subtus valde elevata, ad 4–5 mm crassa, dense ferrugineo-tomentosa, demum ± glabrescens; nervi laterales utrinque ca. 25, sursum arcuati et 2–4 mm intra marginem regulariter arcuatim conjuncti, supra impressi, subtus conspicue prominentes. Inflorescentiae vulgo biflorae in ramis efoliatis sitae; pedicelli crassi, ferrugineo-tomentosi, 1–1.5 cm longi, basi bractea minuta et infra calycem bractea altera vaginiformi-amplectenti majore parati. Alabastra subglobosa, obtusa, ca. 1.5 cm diam. Sepala basi breviter coalita, ovata, acuta, mox reflexa, 12–15 mm longa. Petala crassa, extus tomentella, oblonga, apice rotundata, 20 mm longa et 8–10 mm lata, interiora apicem versus intus carinata. Stamina numerosa, ca. 5 mm longa, appendice connectivi semiglobosa glabra; stamina interiora sterilia. Carpella ca. 4 mm longa. Monocarpia ca. 30 mm longa, rugosa, apice apiculo ca. 1 mm longo parata.

TYPE: VENEZUELA: Territorio de Amazonas: Cerro de la Neblina, Río Yatua, frequent in rainforest southeast of Base Camp, elev. 140 m, Dec. 14, 1953, *Bassett Maguire, John J. Wurdack & George S. Bunting 36774* (NY).

VENEZUELA: Territorio de Amazonas: Ríos Pacimoni-Yatua, Casiquiare, in forest along uppermost Río Yatua, 100–140 m, Dec. 7–8, 1953, *Bassett Maguire, John J. Wurdack & George S. Bunting 36713* (NY and Holm.).

The new species described here is of particular interest because of its very large leaves. Being from 60–70 cm long and about 25 cm broad, they are actually larger than those of any so far known member of the *Annonaceae. Polyalthia dolichophylla* and *Cremastosperma novogranatense* also have large leaves, up to 50 cm long and in *Guatteria guianensis* leaves may be up to 60 cm long. *Anaxagorea gigantophylla* probably holds the long-leaf record in this family.

Systematically, this species is most closely related to *A. dolichocarpa,* with which it agrees in the presence of sterile stamina inside the fertile ones, and in having the same small stellate hairs on the under sides of its leaves. Its gigantic leaf dimensions, and the much more numerous lateral nerves impressed on their upper sides, however, distinguish this new species from *A. dolichocarpa.*

Heteropetalum spruceanum R.E.Fr. var. **longipetala** R.E.Fr., var. nov.

A typo differt petalis exterioribus lineari-lanceolatis arcuatim recurvatis, 1.5–2 cm longis et ca. 9.5 cm latis.

TYPE: COLOMBIA: Río Atabapo, occasional along drowned river margin between San Fernando de Atabapo and Cacagual, 150 m elevation, 18 Nov., 1953, *Bassett Maguire, John J. Wurdack & George S. Bunting 36261* (NY).

Vernacular name: "Majagua."

The genus *Heteropetalum* belongs to the North Brazilian flora; it is indigenous in the Rio Negro and Rio Casiquiare districts, but also occurs in the adjoining parts of Venezuela and Colombia. The two species so far known—*H. brasiliense* and *H. spruceanum*—are very closely related, and it might possibly be more correct to unite them into one species. The genus is characterized by the greatly reduced size of its outer petals; these are strikingly smaller than those of the inner whorl, and in the species so far known very like the sepals. In *H. brasiliense* the sepals and outer petals are of equal size and short-pointed, but in *H. spruceanum* they are protracted into narrow tips. In our variety *longipetala,* which in respect of its vegetative parts is closely related to *H. spruceanum,* the outer petals—in the rest of the genus short and sepal-like—are nearly 2 cm long; the fact that they are directed outwards and arched backwards in a peculiar way is very striking.

The great reduction of the outer petals into sepal-like shapes which characterizes the genus *Heteropetalum,* has previously led some authors to attach the genus to the *Miliusa* group of the *Annonaceae.* In a paper published in 1942 (in Arkiv för Botanik) the present writer has, however, tried to show that this character is not particularly important from a systematic point of view, and that in other respects this genus fits well into the *Guatteria* section of the *Annonaceae* system. The fact that a type like the variety described here has been found to have long outer petals quite different from the sepals provides additional support for the opinion that the relationship of *Heteropetalum* to the *Miliusa* group is not very close.

DROSERACEAE

Drosera L.

Specimens of *Drosera* recently collected in Guayana include with few exceptions all species now known for Venezuela. The following key leads to the material at hand from Guayana and Venezuela.

Key to the Species of Drosera

1. Styles 3 or 5, not bipartite.
  2. Styles 3, ramiform-penicillate at the tips; stems branched-fastigiate; leaves with obvious petioles; scapes lacking; flowers solitary and short-pedicellate; seed 0.6–0.8 mm long, oblong, finely foveolate in 16–18 vertical lines; sect. *Meristocaulis.* 1. *Drosera meristocaulis*
  2. Styles 5, ramiform-penicillate at the tips; leaves without obvious petioles; scapes 10–20 cm long, glabrous or sparingly glandular-pubescent; seed elliptic-ovoid, ca. 0.3 mm long, biapiculate, foveolate in 8–10 vertical lines; sect. *Thelocalyx* 2. *Drosera sessilifolia*
1. Styles 3, bipartite to the base; sect. *Drosera.*
  3. Scapes evidently or strongly pubescent or glandular-pubescent.
    4. Scapes stipitate-glandular.
      5. Leaves 2 cm or less long.
        6. Scapes 10–25 cm long, moderately or strongly stipitate-glandular, (5) 10–15-flowered; leaves strongly fuscous-strigose-pilose beneath; seed subclavate, 0.8–1.0 mm long, prominently bullate-papillate. 3. *Drosera roraimae*
        6. Scapes 5–8 cm long.
          7. Scapes sparingly stipitate-glandular-pilose, mostly solitary, sometimes 2–3, 2–4-flowered; leaves glabrous beneath; sepals oblong-ovate, erose-denticulate, externally pilose; seed "obovoid, foveolate." 4. *Drosera cayennensis*
          7. Scapes and inflorescence conspicuously pilose-stipitate-glandular, mostly 2–5, sometimes solitary, 2–4-flowered; sepals acutish; seed 0.3–0.4 mm long, subglobose, foveolate in vertical lines. 5. *Drosera arenicola*

5. Leaves 8–12 cm long; seed ellipsoidal, ca. 0.75 mm long, scrobiculate-punctate. 6. *Drosera cendeensis.*

4. Scapes sparsely or moderately septate-villous, not glandular, 2–8 cm long, 2–5-flowered; petioles densely strigose-villous beneath; blades marginally strigose, otherwise glabrous beneath; seed ovoid-subglobose, (0.3) 0.4–0.5 mm long, apiculate, foveolate in 12–16 (18) vertical lines. 7. *Drosera kaieteurensis.*

3. Scapes glabrous or essentially so, or inconspicuously very sparingly glandular-puberulent.

8. Calyx 3–5 mm long.

9. Leaf-blades broadly spathulate or obovate; scapes 2–5, filiform, glabrous, 1–3 cm long, 2–3-flowered; sepals oblong, obtuse at the apex; seed 0.3–0.4 mm long, oblong-subglobose, finely foveolate. 8. *Drosera pusilla.*

9. Leaf-blades oblanceolate or narrowly spathulate; scapes neither capillary nor filiform.

10. Leaves 3–4 cm long, the petioles 3 to 4 times exceeding the blades; scapes 8–15 cm long; seed 0.7–0.9 mm long, oblong, densely and irregularly muricate-papillate. 9. *Drosera intermedia.*

10. Leaves 1–2 cm long; the petioles subequal or less than twice longer than the blades; scapes usually 2–3, angular-compressed, 10–25 cm long, subglabrous; calyx ca. 3 mm long, the sepals lanceolate-oblong, acute, externally sparsely glandular-puberulent; seed scrobiform-fusiform, reticulate. 10. *Drosera communis.*

8. Calyx 2.0–2.5 mm long.

11. Stipules adnate for 0.5–0.6 mm, dissected to the base in 5–6 acicular segments; scapes usually solitary, capillary; calyx minutely glandular-puberulent; seed shining black, 0.3–0.4 mm long, narrowly oblong-elliptic, biapiculate, foveolate in ca. 10 vertical rows. 11. *Drosera esmeraldae.*

11. Stipules free to the base or adnate for 0.1–0.3 mm, irregularly dissected into lanceolate segments for 2/3 their length; scapes more often 2–3, (ours) capillary; calyx glabrous; seed brownish, ca. 0.4 mm long, ellipsoid-subglobose, costulate-papillose in 14–16 vertical ridges. 12. *Drosera capillaris.*

Meristocaulis Maguire & Wurdack, sect. nov.

Styli 3, integri ad apices ramiformi-penicillati; caulibus paucifurcatis; stipulis conspicuis; scapis defectis; floribus solitariis, brevipedicellatis; seminibus oblongis foveolatis. Monotypica.

TYPE species: *Drosera meristocaulis* Maguire & Wurdack.

Meristos (μεριστός); divided; *caulos* (καυλός), stem.

1. **Drosera meristocaulis** Maguire & Wurdack, sp. nov.

Caules 5–15 cm longi ad apices pauciramosi, fastigiati, foliis demum marcescentibus; foliis confertis ascendentibus, demum abrupte reflexis; stipulis scariosis adnatis ad basis, 2-carinatis 8–10 mm longis, 3-partitis, segmentis fimbriate laceratis; petiolis glabris, 6–8 mm longis teretibus aliquantum sursum compressis; laminis anguste oblanceolatis 4–5 cm longis, 8–12 mm latis, subtus glabris; escaposa; floribus solitariis vel aliquando 2–3, axillaribus, subterminalibus; pedicellis 3–4 mm longis, glabris, cum una sola angusta bracteola 2–4 mm longa; sepalis 5, elliptico-oblongis 4–5 mm longis, 1.5 mm latis, obtusiusculis externe exigue albo-pustulatis; hypanthio ca. 1 mm longo; petalis oblanceolatis, ca. 10 mm longis; staminibus 5; filamentis planis fragilibus ca. 4 mm longis, 3 mm latis; antheris oblongis 4-lobatis, 2-locularibus, ca. 0.8 mm longis; ovariis 3-locularibus; stylis 3, simplicibus, ad apicem ramis penicellatis; capsulis 1.5–1.8 mm longis, obovato-subglobosis, 3-lobatis; seminibus nigris oblongis 0.6–0.8 (1.0 non sicco) mm longis, minute foveolatis in 16–18 lineis verticalibus.

TYPE: fastigiate perennial herb with conspicuous silvery stipules, narrow leaves and sessile white flowers; locally frequent on boggy open cumbre savanna, at Cerro de la Neblina, 1900 m altitude, Territorio Amazonas, Venezuela, January 6, 1954, *Maguire, Wurdack & Bunting 37133* (holotype, NY).

Distribution. Known only from the type locality in open bog savanna on the summit of Cerro de la Neblina, where the plant is a frequent member of the bog society.

D. meristocaulis seems to represent a primitive member of the genus for which there are no recognized close affinities. It fits into the subgenus *Rorella* DC according to the delimitation and arrangement of Diels[10] because of hypogaeous stems and conspicuous stipules. Its unique branching and (later) fastigiate and escapose habit exclude the plant from any other previously circumscribed section; this necessitates the erection of the new section, *Meristocaulis,* to accommodate it.

The other members of Guayana *Drosera,* all with non-branching, rosulate, scapose habit, belong to and find ready affinity in the section *Drosera* (*Rossolis* Planch.) with the exception of *D. sessilifolia* sect. *Thelocalyx.* It is difficult to perceive any direct or recent phyletic connection between *D. meristocaulis* and its Guayana congeners.

If the fundamental morphologic characters of *D. meristocaulis* indicate a derived condition, then apparently no intermediate stages toward this evolutionary apogee occur, or at least none have been observed in the Highland area or elsewhere. If the morphology of *D. meristocaulis* is to be interpreted as primitive, then one must postulate for it a remote single-line development from an ancient ancestral prototype, and that no derivatives now known have been cut off from it. We are inclined toward this latter view. In manner of branching, *D. meristocaulis* is most suggestive of the monotypic Hispanian and Moroccan genus *Drosophyllum* with which our plant has no affinity.

2. **Drosera sesilifolia** St.-Hil. Pl. Remarq. Brés. & Par. 1: 259. *pl. 25A.* 1824.

Type locality: Sertão do Rio S. Francisco, Minas Geraës, Brazil.

Distribution. Moist open places, generally at lower altitudes; southern and central and Territorio Rio Branco, Brazil; the Rupununi Savannas, British Guiana; and granitic areas below 500 m altitude in the Río Orinoco drainage, Venezuela.

3. **Drosera roraimae** (Klotzsch ex Diels) Maguire & Laundon[11] stat. nov.

D. montana St.-Hil. var. *roraimae* Klotzsch ex Diels. Pflanzenreich 4 (112): 90. 1906.
D. montana St.-Hil. var. *robusta* Diels, Notizb. 6: 136. 1914.

Stem short, invested by marcescent leaves; leaves rosulate, more or less conspicuously tawny-strigose-hirsute on the lower surface; stipules conspicuous, lacerate, 0.4–0.6 mm long; petiole plane, 6–10 mm long; blade spathulate-obovate, ca. 3–5 mm broad, 5–6 mm long; scape 15–25 cm long; inflorescence coarsely stipitate-glandular, (5–) 10–15-flowered; flowers secund; pedicels 3–4 mm long; sepals stipitate-glandular, oblong-elliptic, acutish, 3.5–4.5 mm long (non-fertile flowers smaller); petals broadly obovate, 6–8 mm long; styles 3, dissected to the geniculate base, the apices forked; seed black, subclavate, 0.8–1.0 mm long, rounded-truncate at the apex, narrowed at the base, prominently low-bullate-papillate, the papillae in 15–20 more or less vertical rows.

TYPE: *Schomburgk 1034,* Mt. Roraima [Venezuela].

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[10] Diels, L. Droseraceae. Pflanzenreich 4 (112): 62. 1906.

[11] In studies carried on at the British Museum, Mr. J. R. Laundon had independently concluded that *Drosera roraimae* should be removed from *D. montana* and elevated to specific status. When we learned of his concurrent opinion, we asked Mr. Laundon to join us in the presentation of *D. roraimae.*

Distribution. Wet boggy or sandy habitats, plateaus and mountain summits, on sandstone, throughout the Guayana Highland. Often flowers of some plants fail of fertilization or for some reason become abortive and do not produce seed. The flowers of such plants are smaller than those of fertile plants.

Specimens deposited at New York: BRITISH GUIANA: Chinowieng, Ayanganna Plateau, *Maguire & Maguire 40645*. VENEZUELA: Gran Sabana, Mt. Roraima: *Tate 349, 373, 432A: Pinkus 98; Steyermark 58784, 58858;* Auyán-tepuí, *Tate 1116;* Ptarí-tepuí *Steyermark 59743;* San Rafael, *Maguire 33614;* Chimantá-tepuí, *Steyermark & Wurdack 148; 462;* Guaiquinima, *Maguire 32759, 32825;* Serra do Sol, *Maguire & Maguire 40395;* Terr. Amazonas: Cerro Duida, *Tate 481, 674; Steyermark 58193; Maguire, Cowan & Wurdack 29696;* Cerro Sipapo, *Maguire & Politi 27570;* Cerro Huachamacari, *Maguire, Cowan & Wurdack 30155;* Cerro de la Neblina, *Maguire, Wurdack & Bunting 36931, 37110.*

Specimens deposited at the British Museum and/or Kew. *Abbensetts 11* (K); Appun *1157* (K); Forest Department of British Guiana 2864 (K); *Quelch & McConnell 42* (K), 85 (K), *154* (K); *681* (BM, K); *Im Thurn 313* (BM, K); *Ule 8609* (K), *8610* (K).

Closely related to the variable, poorly understood and inadequately circumscribed population comprising *Drosera montana* St.-Hil., sensu lat., of the Brazilian Plateau, which is ordinarily a much smaller plant with a finer glandular pubescence, much shorter (3mm) stipules, and seed which are smaller, with more acute bases, and 8–10 sharply defined vertical rows of papillae.

4. **Drosera cayennensis** Sagot ex Diels, Pflanzenreich 4 (112): 86. 1906.

TYPE: *Sagot 1228*, French Guiana.

Distribution. Savannas of the Río Negro region, Brazil and French Guiana according to Diels; attributed by Brummer-dinger to the upper Orinoco region of Venezuela; Río Chiguirête, Edo. Bolívar, Venezuela, *Wurdack & Guppy 17*.

5. **Drosera arenicola** Steyermark, Fieldiana Bot. 28: 243. 1952.

Diminutive; stem very short, leaves rosulate, conferted; stipules 3 mm long; petioles 5–8 mm long, plane, little narrower than the blade, strigose beneath; blades narrowly oblanceolate, 4–5 mm long, sparingly or moderately strigose beneath, scapes 2–3 or sometimes solitary, 1–7 cm long, 1–10-flowered, moderately pilose-stipitate-glandular, particularly in the inflorescence; sepals lanceolate, acutish, ca. 2.5 mm long, rather strongly stipitate-glandular; styles 3, bipartite to the base; seed subglobose ca. 0.3–0.4 mm long, foveolate more or less in vertical lines.

Drosera arenicola var. **arenicola**.

Scapes 1–3, 1–2 cm long, 1–3 (4)-flowered; sepals acute, entire.

TYPE: Santa Teresita de Kavanayén, Gran Sabana, Edo. Bolívar, Venezuela, *Steyermark 60920* (Holotype, F).

Additional specimens. Gran Sabana, Edo. Bolívar; Auyán-tepuí, *Tate 1127;* Kavanayén, *Lasser 1739, 1811;* Chimantá-tepuí, *Steyermark & Wurdack 460, 1057.*

Distribution. Known only from boggy savannas, Kavanayén, at 1200 m alt., and from the cumbres of Auyán-tepuí and Chimantá-tepuí, at 1800–2000 m alt.

Drosera arenicola var. **occidentalis** Maguire & Wurdack, var. nov.

Folia rosulata, conferta, 10–12 mm longa, subtus moderate fusco-strigosa; stipulis fusco-membrano-scariosis ca. 3 mm longis, in segmentis setaceis, ca. 2 mm longis divisis; petiolis 0.7–0.9 mm latis, 6–8 mm. longis; laminis anguste oblongo-oblanceolatis, 3–4 mm longis, ca. 1.5 (2.0) mm latis; scapis 1–3, 2–8 cm longis, moderate piloso-stipitato-glandulosis, (3) 4–10-floribus; sepalis subobtusis, inconspicue eroso-denticulatis vel integris; stylis ca. 3 mm longis, a basim bipartitis; apicibus integris, dilato-flabellatis; seminibus subglobosis, nigris, plus minusve apiculatis, foveolatis in lineis verticalibus.

TYPE: flowers white, about margins of pool, infrequent, cumbre, Cerro Guanay, Río Manapiare, Río Ventuari, Terr. Amazonas, Venezuela, at 1800 m alt., February 2, 1951, *Maguire, Phelps, Hitchcock & Budowski 31715* (Holotype, NY). Paratypes, Terr. Amazonas, Venezuela: flowers pink, Cerro Guanay, at 1800 m alt., *Maguire, Phelps, Hitchcock & Budowski 31716;* Cerro Parú, Río Ventuari, 1949, *Phelps & Hitchcock 526-A;* flowers white, frequent, moist ledge, cumbre, Cerro Parú, at 2000 m alt., *Cowan & Wurdack 31142;* frequent, moist sand pockets, sabanita, west rim, Cerro Parú, at 2000 m alt., *Cowan & Wurdack 31205.*

Distribution. Known presently from the cumbres of Cerro Guanay in the north Ventuari drainage, and Parú in the south Ventuari drainage, Venezuelan Amazonas.

By virtue of its similar habit, identical leaves and seed, the var. *occidentalis* is to be associated with the eastern Gran Sabana *D. arenicola* Steyermark. The western variant differs chiefly in its consistently longer scapes, more numerous flowers, and less acute and erose-subdenticulate sepals.

6. **Drosera cendeensis** Tamayo & Croizat, Lilloa 17: 175. 1949.

TYPE: En el páramo de Cendé, Andes, Lara—Trujillanos, Venezuela, 3000 m alt., *I. Tamayo 1430* (Holotype, VEN).

Distribution. Known only by three collections made in the páramo in the vicinity of Cendé by Isabel Tamayo.

7. **Drosera kaieteurensis** Brummer-Dinger, Act. Bot. Neerl. **4:** 137. 1955.

TYPE: Kaieteur Savanna, *Maguire & Fanshawe 23446* (Holotype, NY).

Distribution. Moist sandy or rocky situations in the Gran Sabana region of Venezuela and adjacent Pakaraima region of British Guiana. Ascribed by Brummer-Dinger also to Trinidad.

Additional specimens. British Guiana, Pakaraima Mountains: Membaru Creek, *Pinkus 24;* Karaurieng River, *Maguire & Fanshawe 32286;* Holi-tepu, *Maguire & Fanshawe 32517;* Chinowieng, *Maguire, Bagshaw & Maguire 40619.* Venezuela, Edo. Bolívar, Gran Sabana: Ptari-tepui, *Steyermark 59970;* Kavanayén, *Steyermark 60497.*

8. **Drosera pusilla** H.B.K. Nov. Gen. & Sp. 5: 305. *pl 490, f. 1.* 1821.

TYPE: Sandy places, Río Negro, Venezuela, *Humboldt & Bonpland sin. no.*

Distribution. Savannas and sandy places; Río Negro near San Carlos, Amazonas, Venezuela.

9. **Drosera intermedia** Hayne, Jour. Bot. Schrad. **1800** (1): 37. 1801.

TYPE: Hamburg near Eppendorf, *Hayne s. n.*

Distribution. Plants of wet sandy boggy and *Sphagnum* areas, Europe, North America, Central America, the West Indies; and in South America; Trinidad, British Guiana, Suriname (the coastal area and Tafelberg), the Gran Sabana, Venezuela.

10. **Drosera communis** St.-Hil. Pl. Remarq. Brés. & Par. **1:** 267. 1824.

TYPE: Saõ Paulo, Brazil, *St.-Hilaire sin. no.*

Distribution. Colombia and southern Brazil, according to Diels; in Venezuela generally distributed but not common in areas of lower altitudes associated with sandstone.

11. **Drosera esmeraldae** (Steyerm.) Maguire & Wurdack, stat. nov., descr. emend.

D. tenella var. *esmeraldae* Steyerm. Fieldiana Bot. **28:** 244. 1952.

Stems very short; leaves rosulate; petioles ca. 5 mm long, sparingly hirsute beneath or merely ciliolate; stipules adnate for 0.5–0.6 mm dissected to the base, with 5–6 acicular segments; blades suborbicular, ca. 2.0–2.5 mm in diameter, glabrous beneath; scapes solitary, capillary, glabrous, 5–8 cm long, 3–5-flowered;

flowers minute, the calyx ca. 2.5 mm long; hypanthium minutely and very sparingly glandular-puberulent; sepals broadly ovate, acutish, 1.5–2.0 mm long; petals broadly elliptic-ovate, 2.0–2.5 mm long, carpels 3; styles 3, bipartite to the base, the segments ca. 1.5 mm long, entire, obtuse or truncate; seed 0.3–0.4 mm long, black, narrowly oblong-elliptic, more or less biapiculate, foveolate in ca. 10 vertical rows.

TYPE: corolla pale lilac, wet places in savanna, between Esmeralda Savanna, and southeastern base of Cerro Duida, at 200 m alt., Terr. Amazonas, Venezuela, August 22, 1944, *Steyermark 60920* (Holotype, F; isotype, NY).

Distribution. Known only by two collections, the type and *Maguire, Cowan & Wurdack 29612* from Caño Culebra, Cerro Duida, at 1600 m alt.

The closest congener of *D. esmeraldae* seems to be *D. pusilla* H.B.K. This latter species is more diminutive, pluri-scapose, with flowers about twice larger (4–5 mm long), and seed subglobose.

12. **Drosera capillaris** Poir. in Lam. Encyc. 6: 299. 1804,

? D. *tenella* Willd. ex Roem. & Schult. Syst. Veg. 6: 763. 1820.

Type locality: Carolina, North America.

Distribution. Moist sandy areas in the coastal U. S. from Virginia to Texas; Central America; the West Indies; and South America from Venezuela to Brazil.

Venezuelan and Guianan plants, so far as available material indicates, are consistently smaller with conspicuously smaller flowers and seed. They seem to fit the description of *D. tenella,* which may well represent a distinct geographical race of *D. capillaris.*

LEGUMINOSAE-MIMOSOIDEAE[12]

Parkia truncata Cowan, sp. nov.

Arbor 20 m alta, ramulis minute sparseque puberulis. Folia alterna, pinnae (5-) 6–7 (-8)—jugata, oblongae; petiolus 3–3.5 cm longus, minute puberulus, in sectione triangularis, glande elliptica, depressa, petioli prope apicem posita, rachis (8.5-) 12–15.5 cm longa, in sectione plus minusve triangularis, minute puberula, rachilla 8–11 cm longa; foliola 15–25-jugata, uninervia, glabra, valde discolorata et facie superiore fusca, 12–18 mm longa, 4 mm lata, oblonga, ad basim inaequilateralia, latere inferiore in auriculam acutam prolongato, latere superiore obtuso, ad apicem truncata, integra vel leviter retusa, costa leviter salienti, venis planis supra, infra leviter salientibus. Inflorescentiae erectae, 55–100 cm longae, pedunculo 6 cm longo, sparse minuto-puberulo, ramulis paucis, ca. 10–12 cm longis, minuto-puberulis; capita ovata, ca. 4 cm diametro, parte inferiore flava, parte superiore fusca, axe clavato, 3.5-4.5 cm longo, puberulo; capitorum ad basim flora feminea, staminodiis 2 cm longis, filiformibus, glabris, calyce 6 mm longo, ad apicem puberulo, corolla glabra, ovario glabro, ad apicem flores hermaphroditi, calyce 5 mm longo, ad apicem puberulo, corollarum lobis ad apicem minutissime ciliolatis, staminorum filamentis 9 mm longis, ovario glabro, stipitato. Fructus immaturus angusto-oblongus, curvatus, 14–15 cm longus, ca. 2 cm latus, fuliginoso-velutinus, stipite 2.5–3.5 cm longo.

TYPE: tree 20 m tall. Inflorescences erect, sparsely branched. Lower part of head yellow, upper part with brown perianths and white stamens. Granite monadnock about 20 miles above Playa Alta, Río Cunucunuma, Terr. Amazonas, Venezuela, December 28, 1950, *Bassett Maguire, Richard S. Cowan & John J. Wurdack 30440,* (NY). Paratype: same data and collectors, *30453* (NY).

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[12] By Richard S. Cowan.

The relationship of this species is certainly with *P. nitida* Miq., a Guianan species. *P. truncata* differs by its alternate leaves, by its lack of a waxy bloom on the lower leaflet surfaces, by truncate leaflets (hence the specific epithet), and by the erect inflorescences of heads, most of which are smaller than most of those *P. nitida* I have seen.

The fruits of *P. truncata* are dark-brown-velutinous but the presence or absence of pubescence in this group may not be very significant. In material assigned by Dr. Amshoff to *P. nitida,* the hermaphrodite flowers at the apex of the heads have glabrous or nearly glabrous pistils but the flowers near the base of the hermaphrodite part of the head are densely pubescent. In the flowering material of *P. truncata* the ovaries are uniformly glabrous but the fruiting specimen has densely velutinous pods. There is little doubt that the two collections are conspecific, although it is possible that two subspecific taxa are involved. It appears better to conclude that the presence or absence of pubescence is a character in this group which varies independently and indiscriminately.

LEGUMINOSAE-CAESALPINIOIDEAE

Dicymbe Spruce ex Benth. & Hook. Gen. Pl. 1(2):564. 1865.

In the winter of 1950, Drs. Maguire, Wurdack, and Cowan collected in Venezuela a leguminous plant which at the time was of unknown affinity generically and until this year it remained so. This winter, duplicates of the collections of this plant were sent to Mr. N. Y. Sandwith, who kindly studied it and suggested that it was to be associated with the genus *Dicymbe.* He also compared some of the types in this genus; for this assistance I am very grateful.

With the recognition of the relationship of that plant, several other collections proved to represent still other new species of the genus. In the light of these additions, it seems wise to present a preliminary treatment of the genus.

It is evident that in this group we are confronted with another of the reduction series which seem almost characteristic of this part of the Caesalpinioideae; the problem to resolve is the status to be accorded each of the stages of the series. The corolla is more involved in this group than any of the other flower parts. In sect. *Dicymbe* the corolla is composed of five, equal or subequal, petals; sect. *Triplopetala,* as the name implies, is characterized by three complete petals and two petalodia[13]; in sect. *Eremopetala* four of the five petals are reduced to petalodia but the fifth has a well-developed blade; and the species of sect. *Apoxypetala* have all the petals reduced to subulate-lanceolate petalodia. In spite of the obvious differences between the extremes of this reduction series, I feel that the phylogeny of the group is better expressed by treating it as one genus, consisting of two subgenera, each with two sections.

Of the four sections recognized, three require names and they have been named with Greek compounds signifying the petal condition of each group. *Eremopetala* refers to the single, "lonely" petal; *Apoxypetala* refers to the absence of complete petals, that is, the petals are "reduced"; and *Triplopetala* refers to the three complete petals of the one species included here. This is the species formerly referred to *Dicymbopsis* by Ducke and ordinarily the generic name would be used as a infrageneric epithet but here it is impossible, according to paragraph four of Article 31 of the Rules; the sectional name must not repeat the generic name with the ending "-opsis."

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[13] For the distinction between petals and petalodia, see Mem. N. Y. Bot. Gard. 8:259 (1953).

The keys to the species in each of the sections is followed by notes on each of the species and citations of specimens seen; in all cases, only collections represented at the New York Botanical Garden are cited. There has been no attempt to arrange the species phylogenetically, but the related species are grouped together. Latin diagnoses to validate the subgenera and sections will be found in the part dealing with the species.

Subgenera and Sections of *Dicymbe*

1. Complete petals 3 or 5, equal or slightly unequal; incomplete ones without well-developed blades. Sepals 4. Bracteoles without gland at the apex, free from the cupular hypanthium (except in *D. jenmani*). Subg. *Dicymbe* 2.
1. Complete petals one or none, incomplete ones without well-developed blades. Sepals 5. Bracteoles with terminal gland, united in basal part of the cylindrical hypanthium. Subg. *Apoxypetala* 3.
2. Petals 5, without well defined stipes. Sect. *Dicymbe.*
2. Petals 3, stipitate (6. *D. amazonica*). Sect. *Triplopetala.*
3. Complete petal one, with distinct stipe. Sect. *Eremopetala.*
3. Complete petals none, all vestigial. Sect. *Apoxypetala.*

Sect. Dicymbe

1. Bracteoles less than 1.5 cm long. Hypanthium about 1 mm long. Leaflets narrowly lanceolate, 5–8 cm long, 1.5–2 cm wide. 1. *D. heteroxylon.*
1. Bracteoles 2–3 cm long. Hypanthium much longer than 1 mm. Leaflets ovate, oval, or or elliptic, 7–18 cm long, 3–7.5 cm wide. 2.
2. Leaves 2-jugate, glabrous, the petioles 1.5–2 cm long, the blades minutely glandular-punctate on lower surfaces and on fruits. 3. *D. corymbosa.*
2. Leaves 3–6-jugate, the petioles longer, the blades pubescent and epunctate. 3.
3. Leaflets without waxy bloom on under surfaces but slightly strigulose. Petals strongly unequal, one much larger than the remainder. 2. *D. altsoni.*
3. Leaflets with waxy bloom and densely pubescent on under surfaces. Petals equal or only slightly unequal. 4.
4. Pubescence on the lower surface of leaflets erect, the hairs crispate; waxy bloom usually present in minute, annular granules. Bracteoles free from the cupular hypanthium; style 40 mm long; stigma 1.5 mm in diameter. 5. *D. fraterna.*
4. Pubescence on the lower surface of leaflets subappressed, the hairs straight; waxy bloom usually in closely contiguous papillae. Bracteoles united to the cylindric hypanthium through most of its length; style about 30 mm long; stigma less than 1 mm in diameter. 4. *D. jenmani.*

Sect. Eremopetala

1. Leaves 2-jugate, the leaflets 3–6.5 cm long, 2–3.5 cm wide, rotund and slightly retuse. Petals and filaments sparingly strigulose; one complete petal with a 4 mm stipe, attenuate at the base. 7. *D. yutajensis.*
1. Leaves unijugate, the leaflets 8–10 cm long, 5–5.5 cm wide, only rotund. Petals and filaments villose; one complete petal with a 2 mm stipe and cordate at the base. 8. *D. froesii.*

Sect. Apoxypetala

1. Bracteoles adnate to the hypanthium nearly to its apex; apical gland of bracteoles obvious, 1.5 mm long, umbilicate; petals villose. Leaves 5-jugate. 9. *D. uaiparuensis.*
1. Bracteoles adnate to the hypanthium about half its length; apical gland of bracteoles inconspicuous, less than 1 mm long, not umbilicate; petals slightly strigulose externally. Leaves 2-jugate. 10. *D. duidae.*

Dicymbe Subgenus **Dicymbe.**

A subgenere *Apoxypetala* petalis 5 vel 3 (duobus haud expansis), aequalibus vel parum inaequalibus, sepalis 4, bracteolis ad apicem sine glande, liberis, hypanthio cupulari differt.

TYPE species: *Dicymbe corymbosa* Spruce ex Benth.

I. Section **Dicymbe.**

A sectione *Triplopetala* petalis 5, sessilibus differt.

1. **Dicymbe heteroxylon** Ducke, Trop. Woods 81:6. 1945.

This large forest tree is readily recognized by its small, lanceolate leaflets, its smaller flowers in which the hypanthium is shallowly cupular. The inequal androecium clearly relates it to *D. altsoni;* the leaflet pubescence also is identical in the two species.

Only one sheet, on which parts of both the flowering and the fruiting collections originally cited are attached, has been seen.

2. **Dicymbe altsoni** Sandwith, Kew Bull. 1928:371. 1928.

Trees of this species 20–35 m tall and 30–60 cm in diameter have been measured. It is in some sections of British Guiana very common, if not the dominant tree.

The size of the flower parts is variable, the petals especially; the one large petal varies from 2.5 to 3.5 cm in diameter and the other four from 1.5 to 2.2 cm in width. The filaments in the type collection vary from 7–17 mm in length while in a later collection they range from 15 to 25 mm long. The cupular hypanthium, free bracteoles, and inequal androecium relate this species to *D. heteroxylon;* the latter has narrowly lanceolate leaflets and smaller flowers.

The fruit was not known at the time of the original description but now a specimen with fruit has been collected. It is sericeous, alate at the dorsal margin, oblong, about 14 cm long and 4 cm wide. The seeds are compressed, oval in outline, 28–33 mm long, 24–26 mm wide.

Besides the type collection, *Altson 459*, the following collections represent this species: BRITISH GUIANA: Bartica-Potaro Road, *Fanshawe 1057* (F. D. No. 3793), *2702* (F. D. No. 5495), *2749*)(F. D. No. 5548).

3. **Dicymbe corymbosa** Spruce ex Benth. Trans. Linn. Soc. 25:303. 1865.

A complete description of this species is needed but until all the extant collections are assembled, it would seem to be unwarranted. An isotype and three other collections are at hand; only those parts not described originally in full are treated below.

Petioles 12–20 mm long, leaflets glandular-punctate and coarsely reticulate-veined on the lower surface, nitid above and with the costa salient and the veins plane. Inflorescence velutinous, bracts concave, oblong-oval, 10 mm long, 8 mm wide, obtuse, densely strigulose on outer surface, glabrous within except 0.5 mm wide tomentulose marginal band. Bracteoles ovate, deeply concave, (in bud) 18 mm long, 10 mm wide, thick-coriaceous, densely strigulose on the outer surfaces, glabrous within. Hypanthium shallowly cupular, 3 mm deep, 5 mm in diameter, densely strigulose outside, glabrous within; sepals ovate, cucullate apically and minutely erose marginally, glabrous, (in bud) 13 mm long, 7–8 mm wide; petals 5, elliptic, acute, glabrous except for broad sericeous band on the back of each; filaments 7.5–11 mm long (in bud), villose in the basal half, anthers 9–10.5 mm long with the connective villose; stigma peltate, 0.7 mm in diameter; style glabrous; ovary oblong, sericeous, 8 mm long, 2 mm wide, nearly sessile. Fruit oblong, 25 cm long, 4 cm wide, sulcate and bi-alate on dorsal margin, sparsely strigose and minutely gland-dotted, about 5-seeded.

Collections representing this species are: BRITISH GUIANA: *Fanshawe 1017* (F. D. No. 3753), *Fanshawe 2716* (F. D. No. 5515), *Lang 312.* BRAZIL: *Spruce 2791* (type collection number).

The disjunction between the source of most of the collections and that of the type collection might raise legitimate questions, were there much morphological diversity in the group. There is, however, very little such variation, at least in the few collections known. The glabrous and strongly punctulate leaflets, in only two pairs, serve to separate *D. corymbosa* from its relatives.

4. **Dicymbe jenmani** Sandwith, Kew Bull. **1928**:373. 1928.

This is a small tree 2.5–8 m tall which is quite closely related to *D. fraterna.* It is apparently restricted to the sandstone mountains; it is now known from the Kaieteur Plateau and Mt. Ayanganna. (See the discussion following the description of *D. fraterna.*)

The following collections represent this species: BRITISH GUIANA: Kaieteur Plateau, *Maguire & Fanshawe 23157, 32224, Maguire & Maguire 40683, 40687.*

5. **Dicymbe fraterna** Cowan, sp. nov.

Arbor 3–20 m alta, ramulis novellis fusco-tomentulosis, stipulis non visis. Folia (2-) 3 (-4)-jugata, petiolis 4.5–5 cm longis, teretibus, fusco-tomentulosis, rachibus 4.5–11 cm longis, fusco-tomentulosis; petiolulis 4–5 mm longis, fusco-tomentulosis; foliolorum laminae ovatae, elliptico-ovatae, ellipticae, 8–17.5 cm longae, 4.5–7 cm latae, ad basim rotundatae, ad apicem acuminatae vel longo-acuminatae, glabrae nitidaeque supra, infra tomentulosae ceriferaeque, granulis cereis annulariformibus, minutissimis ornatae, costa impressa supra, infra salienti, venis salientibus infra, supra plana vel cum venulisque minute reticulatis. Inflorescentiae terminales et axillares, composito-corymbosae, tomentulosae tomentosaeque, 9.5–10 cm longae, sessiles, bracteis caducis, induratis, subsemicircularibus, obtusis, glabris intra, extus tomentosis; pedicellis 2–3 cm longis, tomentulosis et tomentosis, sulcatis, bracteolis liberis, crasso-coriaceis, late ovalibus, 26–28 mm longis, 14–20 mm latis, obtusis, tomentulosis et tomentosis extus, intus glabris vel sparse strigosis margine excepto, hoc 1–2 mm lato et dense tomentuloso, costa ad dorsum nonnihil salienti. Hypanthium cupulare 5.5–7 mm longum, 8.5–10 mm diametro, tomentulosum et tomentosum extus, intus glabrum; sepala 4, uno dorsuali triangulari, 22 mm longo, 12 mm lato, acuto, dense strigoso extus, intus glabro, cetera anguste-triangulari-lanceolata, acuta, 20–22 mm longa, 5–6 mm lata, dense strigosa extus, intus glabra; petala 5, angusto-elliptica vel oblanceolata, acuta, dense strigosa extus, intus glabra, 25–27 mm longa, 7–12 mm lata. Stamina 10, 45 mm longa, basaliter villosa, antheris oblongis, glabris, 9 mm longis, 2 mm latis. Stigma peltatum, 1.5 mm diametro; stylus 40 mm longus, glaber; ovarium ca. 5 mm longus, 4 mm latum, densissime villosum, 9-ovulatum, gynophoro ca. 5 mm longo, dense villoso ad apicem. Fructus immaturus oblongus, dorsualiter sulcatus, ad 18 cm longus, 3–4 cm latus, lateraliter compressus, tomentosus villosusque.

TYPE: 3–4 m tree, lvs. glaucescent below; flowers creamy-white in rufous-tomentose inflorescences, young fruit rufous-velvety. Frequent on Samwaraknatipu (Holi-tipu), Pakaraima Mts., Kamarang R., British Guiana, Nov. 10, 1951, *Bassett Maguire & D. B. Fanshawe 32535* (NY). Paratypes: tree 20 ft high, in sandy soil; calyx light brown; petals yellow. Membaru Creek, upper Mazaruni R., British Guiana, Sept. 23, 1939, *Pinkus 31*; tree 70 ft high; trunk 14 in diam. Pod brown without, lemon-yellow within, often 3-seeded; seeds white. Membaru Creek, upper Mazaruni R., British Guiana, Feb. 16, 1939, *Pinkus 237*; tree with brown fruit, Ayanganna to Chinowieng, Pakaraima Mts., 1000–1200 m alt., Feb. 7–8, 1955, *B. Maguire, W. M. C. Bagshaw, & C. K. Maguire 40632.*

The similarity in aspect between the new species and *D. jenmani* is so marked that the materials cited above were originally considered to represent the latter species. However, there are some very fundamental differences. *D. jenmani* is the only species of this subgenus with a cylindric hypanthium to which the bracteoles are united. These are characteristics of subgenus *Apoxypetala* but in all other respects *D. jenmani* belongs with the typical subgenus. It differs from *D. fraterna* in the type of pubescence and the shape of the wax-granules on the lower surface of the leaflets. *D. fraterna* also has a longer style, broader stigma, and cupular hypanthium, from which the bracteoles are free.

II. Section **Triplopetala** Cowan, sect. nov.
A sectione *Dicymbe* 3 petalis stipitatis, duobus haud expansis differt.
TYPE species: *Dicymbe amazonica* Ducke.

6. **Dicymbe amazonica** Ducke, Arch. Inst. Biol. Veg. 4:15. 1938.

This is a very distinctive species in its possession of three petals; on the basis of this character it is considered to represent a distinct section. In most other respects it is quite closely related to the typical section, although it has a rather different facies. Only parts of the type collection, *Ducke 35091,* have been examined.

Dicymbe subgenus **Apoxypetala** Cowan, subg. nov.

A subgenere *Dicymbe* petalis singulis vel nullis, sepalis 5, bracteolis ad apicem glande praeditis, ad cylindrici hypanthii basim adhaerentibus differt.
TYPE species: *Dicymbe uaiparuensis* Cowan.

III. Section **Eremopetala** Cowan, sect. nov.
A sectione *Apoxypetala* petalo uno stipitato ceteris haud expansis differt.
TYPE species: *Dicymbe froesii* Ducke.

7. **Dicymbe yutajensis** Cowan, sp. nov.

Arbor 4–8 m alta, ramulis fuscis. Folia bijugata, glabra, petiolis 2 mm longis, leviter compressis, rachibus 18–24 mm longis, supra leviter canaliculatis; petiolulis 1.5–2 mm longis, foliolorum laminae elliptico-ovales, coriaceae, margine leviter revoluto, 3–6.5 cm longae, 2–3.5 cm latae, ad basim obtusae vel subobtusae, ad apicem rotundatae leviter retusaeque, laminarum lateribus ambobus tenuiter venulosis praecipue infra, costa leviter impressa supra, infra salienti. Inflorescentiae terminales et axillares, composito-corymbosae, minute strigulosae, ca. 8 cm longae; pedicellis 7 mm longis, minuto-strigulosis, bracteolis oblongis, navicularibus, 8 mm longis, 4 mm latis, ad apicem umbonato-glandularibus, glande 1 mm longa, obtusa, lateribus ambobus minuto-strigulosis, ad hypanthii basem adharentibus. Hypanthium cylindricum, 3–4 mm longum, leviter minuto-strigulosum, sepala duo adaxilia cohaerentia, 4 mm longa, ca. 1 mm lata, subulato-lanceolata, acuto, glabra, cetera 5 mm longa, 1.5 mm lata, subulato-lanceolata, acuta, glabra; petala 5, uno adaxili petaloideo, stipite 4 mm longo, striguloso, lamina ca. 8 mm longa, 5 mm lata, cetera triangularia, 0.7–1 mm longa. Stamina 10, libera, filamentis 11.5–12.5 mm longis, ad basim strigulosis, antheris oblongo-ovalibus, 2 mm longis, 1 mm latis, glabris. Stylus ad basim strigulosus. Ovarium oblongum, 4.5–5 mm longum, 1.5 mm latum, striguloso-velutinum, stipite ad hypanthii murum adnatum, parte libera ca. 0.5 mm longa, striguloso-velutina. Fructus immaturus 6–6.5 cm longus, 2 cm latus, oblongus, leviter strigulosus, 3–4-seminifer.

TYPE: small bushy tree 4–8 m tall, fruiting only; lvs. 4-foliolate. Frequenton northwest ridge above Camp Yutaje, elev. 1500 m, Serrania Yutaje, Cerro Yutaje, Río Manapiare, Terr. Amazonas, Venezuela, February 23, 1953, *Bassett Maguire & Celia K. Maguire 35379* (NY).

The large petal with four reduced ones places this species near *D. froesii* Ducke, from which it differs in number of pairs of leaflets, their shape and size, and the shape of the single complete petal.

The specific epithet will perhaps not please everyone, but geographic names used as specific names seem appropriate when the species involved are rather close endemics. It may be a little premature to speak of the geographic distribution in this genus, but the species appear to be quite localized in occurrence.

8. **Dicymbe froesii** Ducke, Trop. Woods 90:14. 1947.

The unijugate leaves with larger leaflets, the villose filaments and petals, and the shape of the one complete petal separate this species readily from its only near relative, *D. yutajensis*. The geographic disjunction between the two species is rather wide; the latter is from a sandstone mountain and it is likely that *D. froesii* is either to be found on sandstone or on sands derived from such sandstone mountains. Ducke related *D. froesii* to *D. corymbosa* but there is little more than a superficial resemblance between the leaves of the two species. Only an isotype has been seen.

IV. Section **Apoxypetala** Cowan, sect. nov.

A sectione *Eremopetala* petalis omnibus haud expansis differt.

TYPE species: *Dicymbe uaiparuensis* Cowan.

9. **Dicymbe uaiparuensis** Cowan, sp. nov.

Arbor 10 m alta, ramulis glabris, stipulis caducis non visis. Folia 5-jugata, glabra, petiolis 1.5 cm longis, teretibus, rachibus 8 cm longis; petiolulis 7 mm longis; foliolorum laminae lato-ovatae, coriaceae, 7-9.5 cm longae, 4.5-6 cm latae, ad basim cordatae, ad apicem acuminatae, extremitate obtusa, obscure minuteque venulosae, costa plana supra, infra salienti. Inflorescentiae terminales, composito-corymbosae, strigulosae, 6-10 cm longae, pedunculo 7-15 mm longo, bracteis caducis, non visis; pedicellis 17-25 mm longis, dense strigulosis, bracteolis strigulosis, coriaceis, ellipticis, 12 mm longis, 7 mm latis, ad apicem glande 1.5 mm longa, umbilicata praeditis, prope hypanthii apicem adhaerentibus. Hypanthium cylindricum, ca. 8 mm longum, strigulosum; sepala 5, anguste elliptico-oblonga, acuta ad acuminata, 9.5-12 mm longa, 1.2-2 mm lata, glabra; petala 5, aequalia, anguste elliptico-oblonga, acuta ad acuminata, dense villosa. Stamina 10, libera, filamentis ca. 24 mm longis, villosis ad basim latiorque, subulatis, antheris 3.5 mm longis, 1.5 mm latis, ovali-oblongis. Stigma peltatum; stylus ad basim dense strigosus; ovarium 5 mm longum, 2 mm latum, dense strigosum, stipite ad hypanthii murum adnato, parte libera ca. 1 mm longa, strigulosa.

TYPE: Arbol 10 m alto. Lomas de arenizca entre el cerro Perai, y las fuentes del Río Uaiparu, afluente del Ikabarú, 900 m, Caroni, Estado Bolívar, Venezuela, *F. Cardona 1886* (NY; isotype VEN).

This species can be compared only to *D. duidae*, the only other species in this subgenus; the important differences separating them are set out in the key. The large apical gland on each of the bracteoles of the new species is especially striking and the larger number of pairs of leaflets is a useful characteristic to separate the two species.

10. **Dicymbe duidae** Cowan, sp. nov.

Arbor 4–7 m alta, glabra, ramulis fuscis, stipulis non visis, caducis. Folia paripinnata, bijugata, glabra, petiolis 10–20 mm longis, teretibus, rachibus 15–20(–35) mm longis; petiolulis 2.5–5 mm longis, foliolorum laminae lato-ovatae, coriaceae, 6–11.5 cm longae, 3.5–7.0 cm latae, ad basim cordatae, ad apicem

acutae, extremitate obtusa vel acuta, laminarum lateribus ambobus tenuiter venulosis, costa plana supra, infra salienti. Inflorescentiae terminales, composito-corymbosae (ramulis racemosis), minute strigulosae, 5–7 cm longae, bracteis citius caducis; pedicellis 9–10 mm longis, minute striguloso-velutinis, bracteolis oblongis, reflexis, ad apicem rotundatis, crasso-carnosis, subnavicularibus, striguloso-velutinis extus, intus leviter minuteque strigulosis, ad hypanthii basem adhaerentibus. Hypanthium cylindricum, 5–7.5 mm longum, minute strigulosum, sepala 5, subaequalia, subulato-lanceolata, 6–8 mm longa, 1.7–2.0 mm lata, acuminata, leviter strigulosa extus, intus glabra; petala 5, subaequalia, subulato-lanceolata, 3–3.5 mm longa, 0.8 mm lata, acuta, ad dorsum leviter strigulosa. Stamina 10, libera, filamentis ca. 16 mm longis, subulatis, glabris, antheris 4–4.5 mm longis, 1.5 mm latis, oblongo-fusiformibus, glabris. Stigma peltato-capitatum, minute papillatum, stylus ca. 17 mm longus, glaber, ovarium oblongum, 8 mm longum, 2 mm latum, velutinum, pluriovulatum, subsessile, stipite ad hypanthii murum adnatum, glabrum. Fructus oblongus, glaber, 9 cm longus, 2.5 cm latus, 4–5-seminifer, seminibus ovalibus, compressis, fuscis, 12–14 mm longis, 9–10 mm latis.

TYPE: small tree 4–7 m tall. Fruit bronze-green; buds tan. Petals pinkish, filaments greenish, anthers white. Leaves thin-coriaceous. Occasional in open scrub. Caño Negro Basin, north slopes and ridges, Cerro Duida, 2000–3000 m alt., Terr. Amazonas, Venezuela, Nov. 23, 1950, *Bassett Maguire, Richard S. Cowan & John J. Wurdack 29667* (NY; isotype, K). Paratypes: same data and collectors *29665* and *29666* (NY).

Dicymbe duidae is easily separable from its only relative, *D. uaiparuensis*, by the latter's more conspicuous apical gland on the bracteoles and the larger number of pairs of leaflets; there is also a difference in pubescence on the petals, and the degree of union between bracteoles and the hypanthium furnish additional distinguishing characters.

Excluded species

Dicymbe psilophylla (Harms) Dwyer, Ann. Missouri Bot. Gard. 41: 254. 1954.

Tachigalia psilophylla Harms, Notizbl. Bot. Gart. Berl. 6:305. 1915.

Dwyer in transferring Harms' species cites *Riedel 804*, the type collection number, and a Bondar collection, saying "The glabrous to subglabrous filaments of the stamens (fide Harms), the large reniform stipules, and the very long cigar-shaped fruits leave no doubt that this is a species of *Dicymbe*." I have examined this same material, kindly lent by the Chicago Natural History Museum, and it certainly is no known species of *Dicymbe* and almost surely is quite unrelated to that genus.

Macrolobium Schreb.

Since the publication of my revision of this genus (Mem. N.Y. Bot. Gard. 8:257–342. 1953), it has been necessary to publish an urgent nomenclatural note Brittonia 8:113. 1955), and now a number of new species have been recognized in recent collections made on New York Botanical Garden Expeditions in Venezuela. The new taxa are arranged in the approximate order they would have occupied in the revision; a revised key will be published to include all subsequent modifications when it appears that the rate at which new taxa are being collected has leveled off.

Macrolobium anomalum Cowan, sp. nov.

Arbor(?), ramulis pilosis et pilosulis; stipulae caducae. Petiolus 3–5 mm longus, canaliculatus, pilosus et pilosulus. Foliorum laminae oblongae, 6–7-

jugatae; rachibus 3–6.5 cm longis, pilosis et pilosulis. Foliola 12–23 mm longa, 5–8 mm lata, oblonga, ad basim inaequilateralia, obtusa, ad apicem rotunda et emarginata; supra in costam sparse uncinato-pilosula, infra glabra sed cerifera; costa plana supra, infra saliens. Inflorescentiae sessiles, axillares, 2–4.5 cm longae, axe puberulo; bracteae ovatae, acutae, 2 mm longae, 1.5 mm latae, puberulae extus, intus glabrae, deciduae. Pedicelli 1–1.5 mm longi, puberuli; bracteolae 5.5–6 mm longae, 3.5 mm latae, ovales, mucronatae, puberulae extus, intus pilosulae. Hypanthium cupulare, ca. 1 mm longum, glabrum; sepala 5, glabra, dimorpha, 2 dorsualibus triangularibus, ca. 1.5 mm longis et 1 mm latis, acuminatis, 3 ceteris lanceolatis, ca. 4 mm longis et 1.5 mm latis. Petalorum lamina 4–4.5 mm longa, 4.5–5 mm lata, oblata, glabra, unguiculo 5 mm longo, glabro intus, extus pilosulo ad basim, leviter auriculato. Filamenta ca. 18.5 mm longa, dimidio basali villoso. Stigma capitellatum; stylus pilosus ad basim, ca. 16 mm longus; ovarium marginaliter pilosum lateraliter glabrum, gynophoro 2–2.5 mm longo, piloso. Fructus ignotus.

TYPE: Frequent at base of Caño Coro-Coro, near Base Camp, elev. 150 m, Cerro Coro-Coro, Río Manapiari, Terr. Amazonas, Venezuela, March 3, 1953, *Bassett Maguire & Celia K. Maguire 35510* (NY).

The relationship of this species is not particularly easy to determine but it is tentatively assigned a position approximate to *M. flexuosum* which it resembles in key characters more than in superficial aspect. It differs from *M. flexuosum* by its fewer leaflet pairs, smaller leaflets, and in the vestiture of the ovary. It is also related, to a lesser extent, to *M. microcalyx* and *M. discolor*. It differs from the latter by the smaller, differently shaped leaflets and generally shorter pedicels of *M. anomalum* but it is similar to *M. discolor* in number of pairs of leaflets. From *M. microcalyx* the principal character differences are the distribution of pubescence on the ovary, leaflet size and shape, vestiture of the branchlets, and the number of pairs of leaflets.

The specific epithet is intended to convey the unusual nature of this species in its relationship to so many species without being very closely allied to any one of them.

Macrolobium longipes Cowan, sp. nov.

Arbuscula 0.6–4 m alta, ramulis glabris. Stipulae triangulares, 2 mm longae, 0.6 mm latae, caducae, glabrae. Petioli 4–15 mm longi leviter marginati, glabri. Folia glabra, foliorum laminae (1-)2(-3)-jugata, rachibus (0-)10–35 mm longis. Foliola 40–85 mm longa, 12–31 mm lata, oblonga, oblongo-ovata, oblongo-elliptica vel elliptica, ad basim subaequilateralia, acuta, ad apicem rotunda vel truncata, saepe leviter emarginata, latere inferiore punctato; costa plana supra, infra saliens, venulis subprominulis. Inflorescentiae 8–12.5 cm longae, terminales, glabrae, pedunculo 2–4 mm longo; bracteis caducis, triangularibus, ca. 1 mm longis et latis, glabris; pedicelli (9-)12(-16) mm longi, filiformes, glabri; bracteolae rubrae, 12–17 mm longae, 5–9 mm latae, ellipticae, acutae. Hypanthium cupulare, 2.5–3 mm longum, glabrum, sepalis 5, glabris, 5.5–8 mm longis, lanceolatis, ad apicem minute ciliolatis, duobus adaxillaribus ca. omnino coalescentibus. Petalum rubrum, lamino 5–6 mm diametro, rotundo, glabro, unguiculus 8–11 mm longus. Filamenta 20–25 mm longa, glabra. Stigma capitellatum; stylus ca. 22 mm longus, glaber; ovarium ellipticum, glabrum, gynophoro 3.5–4 mm longo, glabro. Fructus (immaturus) 8–9 cm longus, 3–3.5 cm latus, oblongus, glaber.

TYPE: Fls. red; fruit red at first, green later. Frequent in savanna on right bank of Río Pacimoni 50 km above mouth, Terr. Amazonas, Venezuela, 100–140 m elev., Feb. 7, 1954, *Bassett Maguire, John J. Wurdack & George S. Bunting 37590* (NY). Paratypes: VENEZUELA: Amazonas, Río Pacimoni: savanna on right bank,

60 km above mouth, 100–140 m elev., Nov. 1953, *Maguire, Wurdack & Bunting 36676*; frequent in savanna on right bank, 50 km above mouth, Feb. 1954, *Maguire, Wurdack & Bunting 37572*; frequent in savanna on left bank of Caño Hechimoni, 8 km above mouth, 100–130 m elev., Feb. 1954, *Maguire, Wurdack & Bunting 37643*.

There is every good reason for relating this species to *M. discolor* and to *M. multijugum*, although it is much nearer the former. From *M. multijugum* the new species may be separated most easily on the smaller number of leaflet-pairs, the short peduncles, the larger flowers, and the differently shaped fruits of *M. longipes* (the specific epithet refers to the unusually long pedicels). It differs from *M. discolor* by its punctate leaflets, glabrous inflorescence and flowers, larger flowers, and generally fewer pairs of leaflets.

Macrolobium unifoliolatum Cowan, sp. nov. (Fig. 64.)

Arbuscula vel arbor gracilis 7 m alta, ramulis minute puberulis. Petiolus 3–6 mm longus, minute puberulus, teres, stipulis caducis. Folia unifoliolata, foliola sessilia, lamina coriacea, 13.5–22.5 cm longa, 4.5–8 cm lata, lanceolata ad elliptico-lanceolata ad oblongo-elliptica, aequilateralis, ad basim obtusa ad subobtusa, ad apicem acuminata, glabra supra, infra glabra vel ad costam minute puberula, punctata; costa saliens vel leviter impressa supra, infra saliens, venis venulisque prominentibus. Inflorescentiae 2–12 cm longae, terminales vel axillares, axe minute puberulo, pedunculis subnullis; bracteis deciduis, triangularibus, ca. 1 mm longis et latis, intus glabris, extus glabris vel puberulis, minute ciliolatis; pedicelli 3.5–9 mm longi, puberuli vel glabri; bracteolis lanceolatis, 9–15 mm longis, 3–4 mm latis, longo-acuminatis, glabris vel extus puberulis. Hypanthium cupulare, 2 mm longum, glabrum, sepalis 4, glabris vel ciliatis et dorsualiter pilosulis ad apicem, dimorphis, sepalo dorsuali 5 mm longo, 2.5 mm lato, oblongo-lanceolato, acuto, caeteris 3.5–4 mm longis, 1–1.5 mm latis, acuminatis et plus minusve erosis. Petalum album, lamina rotunda vel subrotunda, 3.5–5.5 mm longa, 4.5–5.5 mm lata, glabra, unguiculo 4.5 mm longo, intra villoso. Filamenta 10–12.5 mm longa, ad basim sparse villosa. Stigma capitellatum, stylus 12.5–20 mm longus, ad basim pilosulosus, ovarium ellipticum, pilosulosum. Fructus ignotus.

TYPE: petal white; stamens red; slender tree 7 m tall in riverine forest just south of Maroa, Río Guainía, Terr. Amazonas, Venezuela, 120–140 m alt., Nov. 28, 1953, *Bassett Maguire, John J. Wurdack & George S. Bunting 36445* (NY).

Macrolobium unifoliolatum var. schultesii Cowan, var. nov.

A var. *unifoliolatum* petiolis 3–4 mm longis, foliolis ad costam puberulis, costa supra salienti, inflorescentia 6.5–12 cm longa, axe dense puberulo, bracteis puberulis extus, pedicellis 4–9 mm longis, dense puberulis, bracteolis 9–10.5 mm longis, extus dense puberulis, sepalis dorsualiter pilosulosis ad apicem, petali lamino rotundo, 5.5 mm diametro, filamentis 12.5 mm longis, stylo 12.5 mm longo differt.

TYPE: bush, flowers white, Raudal Yayacopi (La Playa) and vicinity, about 800 ft alt., Río Apaporis, Amazonas-Vaupés, Colombia, April 15, 1952, *Richard E. Schultes & I. Cabrera 16209* (NY). Paratype: same data and collectors, *16940*.

This species is so utterly different from any previously described, in respect to the leaves, that the casual observer may even fail to relate it to this genus. Not only are the leaves unifoliolate but the leaflet is equilateral and differently shaped from those of most of the other species in the genus. In leaflet shape, at least, the new species is similar to members of the *M. campestre-M. arenarium* complex but its connection with any known species is remote.

The aspect of the typical variety and of variety *schultesii* is very similar, and it was originally thought that this material was quite uniform. It will be noted,

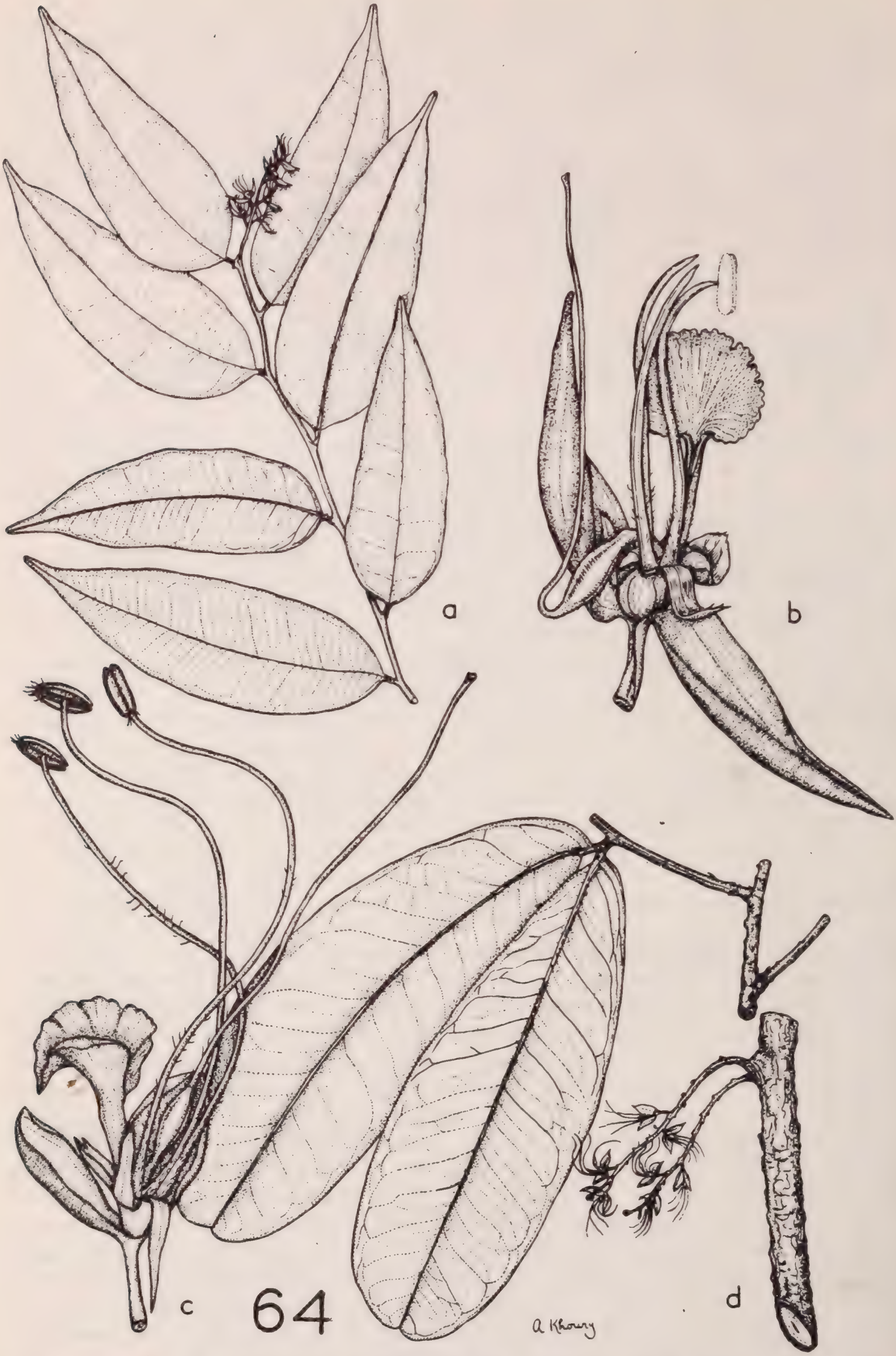

FIG. 64. *a, b, Macrolobium unifoliolatum* var. *unifoliolatum, a,* habit, × ¼. *b,* one flower enlarged, × 4. *c, d, Macrolobium exfoliatum. c,* one flower enlarged, × 4. *d,* habit, × ½. *a, b,* from *Maguire, Wurdack & Bunting 36445; c, d* from *Maguire & Wurdack 34981.*

however, that there a number of characteristics separating the two varieties. It is a pleasure to name this taxon for one of the collectors of the type material, Dr. Richard Evans Schultes.

Macrolobium canaliculatum var. strigulosum Cowan, var. nov.

Arbor 6–8 m altus, ramulis et foliis glabris. Petiolus 4–6 mm longus, desuper compressus, canaliculatus; petioli 0–1 mm longi. Foliola 5–8.5 cm longa, 2.5–4 cm lata, oblonga ad obovato-oblonga, ad basim inaequilateralia, acuta, ad apicem rotunda et leviter emarginata, infra punctata; costa sulcata supra, infra saliens, venis venulisque prominulis. Inflorescentiae (frugiferae) terminales, ca. 8–10 cm longae, axe dense aureo-striguloso, pedunculo ca. 10–20 mm longo. Fructus 10–12.5 cm longus, 3.5–4 cm latus, oblongus, ad suturam dorsualem alatus, glaber, carpophoro 7–9 mm longo, sparse striguloso, 2–5-seminifer, semina immatura ovalia.

TYPE: Occasional in woodland along right fork of Caño Yutaje, elev. 1500 m, Serrania Yutaje, Río Manapiare, Terr. Amazonas, Venezuela, Feb. 21, 1953, *Bassett Maguire & Celia K. Maguire 35361* (NY).

In spite of rather strong convictions against the practice of describing new taxa based on less than complete material, I have described this one on fruiting material only. This course is adopted because I am certain that this is a new taxon and, while it has been treated here as a variety, later flowering collections may prove it to be of specific stature.

Its connection with *M. canaliculatum* is unmistakable but it differs in its strigulose inflorescence axis (hence the varietal epithet), its punctate leaflets, and its sessile or very shortly petiolulate leaflets.

Macrolobium rubrum Cowan, sp. no.

Arbusculae 0.2–2 m altae, ramulis minutissime puberulis; stipulae caducae. Folia glabra, unijugata, rigido-coriacea; petiolus 6.5–12 mm longus, 3 mm diametro, desuper compressus. Petioluli 1–3 mm longi, glabri. Foliola 7.5–15 cm longa, 3–6 cm lata, valde inaequilateralia, arcuata, elliptica, basis latere inferiore auriculato, superiore acuto ad subobtuso, ad apicem acuta et extremitate saepe obtusa; costa sulcata supra, infra saliens, venuli conspicui. Inflorescentiae 4–13 cm longae, terminales, axe minutissime puberulo, pedunculo 0–2 mm longo; bracteis caducis, triangularibus, 1.5 mm longis et latis, acutis, minutissime puberulis extus, intus glabris. Pedicelli 2–4 mm longi, minutissime puberuli; bracteolae 12–14 mm longae, 4 mm latae, oblanceolato-oblongae, obtusae, carnosae, glabrae. Hypanthium 3.5–4 mm longum, glabrum, stipite 1–1.5 mm longo, glabro. Sepala 4, aequalia, 10–11 mm longa, 3–3.5 mm lata, cucullata, oblanceolato-oblonga, ad apicem ciliolata. Petalorum lamina 7 mm longa, 5.5 mm lata, ovalis, glabra, unguiculo ca. 10 mm longo, glabro extus, intus pilosulo, late alato. Filamenta 18–20 mm longa, ad basim villosa. Stigma capitellatum; stylus ca. 14 mm longus, glaber, ovarium ca. 3 mm longum, 1 mm latum, oblongum, glabrum, gynophoro 3.5 mm longo, glabro. Fructus (immaturus) 8–11 cm longus, 3–4 cm latus, oblanceolato-oblongus, ad suturam dorsualem anguste alatus, glaber.

TYPE: Bracts, petal, and stamens red; fruit green. Abundant in sabanita 1 km east of Maroa, elev. 125 m, Río Guainía, Venezuela, April 16, 1953, *Bassett Maguire & John J. Wurdack 35684* (NY). Paratypes: VENEZUELA: Amazonas, Río Guainía: frequent in Sabana El Venado on left bank of Caño Pimichin above Pimichin, elev. 140 m, April 1953, *Maguire & Wurdack 35620*; frequent in sabanita 1 km east of Maroa, 130 m elev., Nov. 1953, *Maguire, Wurdack & Bunting 36412*.

In the key in my revision, *M. rubrum* will run out quite near to *M. punctatum*, and they are rather closely related species. However, they are separable by

several differences: (1) the new species has leaflets on which the costa is more or less sulcate on the upper surface; (2) its bracteoles are considerably larger; (3) its hypanthium is usually longer, and on a shorter stipe; and (4) the sepals and the petal-claw are markedly longer. In floral dimensions, the new species is nearer *M. canaliculatum* but the latter has the petal reflexed and it has rather differently shaped leaflets to separate it from *M. rubrum.*

The specific epithet is chosen as being descriptive of the completely red flowers of this species. In other taxa of the genus, various parts of the flower may be red or reddish but completely red flowers are unusual.

Macrolobium wurdackii Cowan, sp. nov.

Arbor 15 m altus, 20 cm diametro, ramulis et foliis glabris, stipulae mox caducae. Petiolus 30–35 mm longus, ca. 4 mm diametro. Folium unijugatum, foliola sessilia, 32–39 cm longa, 12–14 cm lata, inaequilateralia, leviter arcuata, elliptica, ad apicem rotunda, ad basim inaequilateralia, basis latere inferiore cordato, superiore acuto; costa valde saliens, venae et venulae conspicuae. Inflorescentiae e nodis defoliatis ortae, 12.5–22 cm longae, axe dense crasso-puberulo, pedunculo 6–12 mm longo; bracteis deciduis. Pedicelli 6–9 mm longi, dense crasso-puberuli; bracteolae caducae (fragmento solum praesente), crassissimo-carnosae, crasso-puberulae extus et ad basim intus. Hypanthium 3.5–5 mm longum, crasso-puberulum, stipite 3–3.5 mm longo, crasso-puberulo; sepalis 4, oblongis ad ovalibus, obtusis, concavis, 10–11 mm longis, 5–7 mm latis. Petala decidua, 2–3 vestigialia nonnunquam praesentia. Filamenta 16.5–17.5 mm longa, villosa, 3–4 filamentis vestigialibus praesentibus, villosis. Stigma capitellatum, puberulum, stylus 9.5–10.5 mm longus, ad basim crasso-puberulus, ovarium ellipticum vel elliptico-oblongum, ca. 5 mm longum, 2 mm latum, 4-ovulatum, dense crasso-puberulum, gynophoro 5 mm longo, crasso-puberulo. Fructus ignotus.

TYPE: In young fruit with orange-maroon calyx. Frequent in slope forest at Camp III, elev. 650 m, Cerro de la Neblina, Río Yatua, Terr. Amazonas, Venezuela, January 26, 1954, *Bassett Maguire, John J. Wurdack & George S. Bunting 37385* (NY).

This is perhaps one of the most distinct species in the genus and it is a genuine pleasure, therefore, to name it in honor of my good friend, colleague, and one of the collectors of the type material, Dr. John J. Wurdack.

M. wurdackii is most closely allied to *M. latifolium* but there are abundant differences to separate them. *M. latifolium* is now restricted to the isolated, coastal rain forest near Bahia, Brazil, while the new species occurs on the opposite side of the Amazon Basin in southwestern Venezuela; so geographically speaking, the two relatives are very disjunct. Both species have exceedingly thick, fleshy bracteoles which are early deciduous, four equal to subequal sepals, and much the same type of pubescence. The hairs of *M. latifolium* have been described as clavate in shape but those of the new species are more "peg-like" and have been referred to as thick or coarse in the description.

The two species differ in: (1) habit; (2) leaflet size and shape; (3) position of inflorescence; and (4) flower size.

Macrolobium savannarum Cowan, Mem. N. Y. Bot. Gard. 8:323. 1953.

In the original description of this species, characters of the fruit were not supplied because material was not then available. Now a single fruiting collection (*Maguire & Wurdack 34522*) from the type locality has been received and they may be described as follows: Fruits glabrous, 6.5–8 cm long, 2.5–3 cm wide, oblong, carpophore about 4 mm long; seed laterally compressed, 15 mm long, 12 mm wide, broadly oval, the testa tan, very thin-crustose.

As might have been expected, the fruits of *M. savannarum* are quite similar to those of its nearest relative, *M. pendulum.*

Macrolobium exfoliatum Cowan, sp. nov. (Fig. 64.)

Arbor 8 m alta, 10 cm diametro, cortice ramulorum exfoliato. Folia unijugata; petioli 4.5–5 mm longi, glabri, leviter sulcati; stipulae persistentes, 4.5–6 mm longae, 1–2 mm latae, arcuato-lanceolatae, acutae, ciliolatae. Foliola sessilia, 9–15 cm longa, 3.5–5.5 cm lata, glabra, coriacea, leviter arcuata, elliptico-oblonga, ad basim inaequilateralia, latere inferiore rotundo-obtuse sed superiore acuto, ad apicem rotunda, emarginata, epunctata; costa salienti, venulis leviter salientibus. Inflorescentiae 7–10 cm longae, e nodis defoliatis ortae fasciculatae, sessiles, axe minute puberulo; bracteis persistentibus, triangularibus, ca. 1 mm longis et latis, extus minute puberulis, intus glabris; pedicellus 3–5.5 mm longus, minute puberulus; bracteolae 5.5–7 mm longae, 3 mm latae, ellipticae, glabrae intus, extus minute puberulae. Hypanthium cupulare, 1.5 mm longum, minute puberulum; sepala 4, ovata ad angusto-lanceolata, 2.5–4.5 mm longa, 1 mm lata, glabra, sepala adaxilia biloba vel integra. Lamina petali rotunda, 5 mm longa et lata, unguiculo 5 mm longo, ad basim villosulo. Filamenta 21 mm longa, villosula, antherae ad basim villosulae. Stigma punctiforme, stylus ca. 20 mm longus, ad basim minute puberulus, ovarium 2.5 mm longum, 1 mm latum, minute puberulum. Fructus ignotus.

TYPE: In riverine forest near Piedra Nunca (just north of Piedra Cucuy), elev. 100 m, Río Negro, Terr. Amazonas, Venezuela, April 10, 1953, *Bassett Maguire & John J. Wurdack 34981* (NY).

In my key this species will "key-out" near *M. amplexans,* Which species it resembles in the disposition of its inflorescences and in the characters of the flowers. However, the new species is quite distinct in respect to leaflet shape, exfoliating bark on the branchlets (hence the specific epithet) as well as other, more minor, characters.

LEGUMINOSAE-LOTOIDEAE

Clitoria cerifera Cowan, sp. nov. (Fig. 65.)

Arbuscula virgata 1.5–2.5 m alta, ramulis strigulosis, novellis 4-angulatis. Stipulae persistentes, 4.5–5 mm longae, 1.5–2 mm latae, lanceolatae, acuminatae, parce striatae, strigulosae extus, intus glabrae. Folia 3-foliolata, petiolo 2.5–5.5 cm longo, angulato, parce striguloso, rachibus 2–3 cm longis, angulatis, parce strigulosis, Stipellae persistentes, 3.5–4.5 mm longae, 0.5–1 mm latae, lineari-lanceolatae, acuminatae, glabrae, rigidae. Foliolorum lamina lanceolata ad ovato-lanceolata, petiolulis 3–4 mm longis, parce strigulosis, 10.5–11.5 cm longa, 3.5–4.5 cm lata, ad marginem involuta, ad apicem acuminata, extremitate obutsa mucronulataque, ad basim rotunda, glabra (costa parce strigulosa excepta), infra cerifera, costis impressis supra, infra salientibus, venis primariis 6–8-jugatis, venulis prominentibus. Inflorescentiae 4.5–6 cm longae, ad nodos defoliatos ortae, axe ca. 2 mm longo, striguloso, bracteis persistentibus, 3.5 mm longis, 1.5 mm latis, lanceolatis, extus parce strigulosis. Pedicelli 5–8.5 mm longi, pilosuli, bracteolis, 2.5–4 mm. infra calycem, 4–5 mm longis 1–1.5 mm latis, lanceolatis, striatis, pilosulis. Calycis tubus 15–18 mm longus, minute uncinato-puberulus et parce pilosus extus, intus glaber, lobis 3–8 mm longis, 2 dorsualibus lobis brevioribus lanceolatis ad deltoideis, acutis ad longo-acuminatis, minute uncinatis extus, intus glabris. Vexillum late obovatum, 55 mm longum, 45 mm latum, minute uncinatum et ad basim pilosulum extus, intus glabrum; alae falcato-oblongae, lamina 30 mm longa et 10 mm lata, unguiculo ca. 12 mm longo, minute uncinatae extus, intus

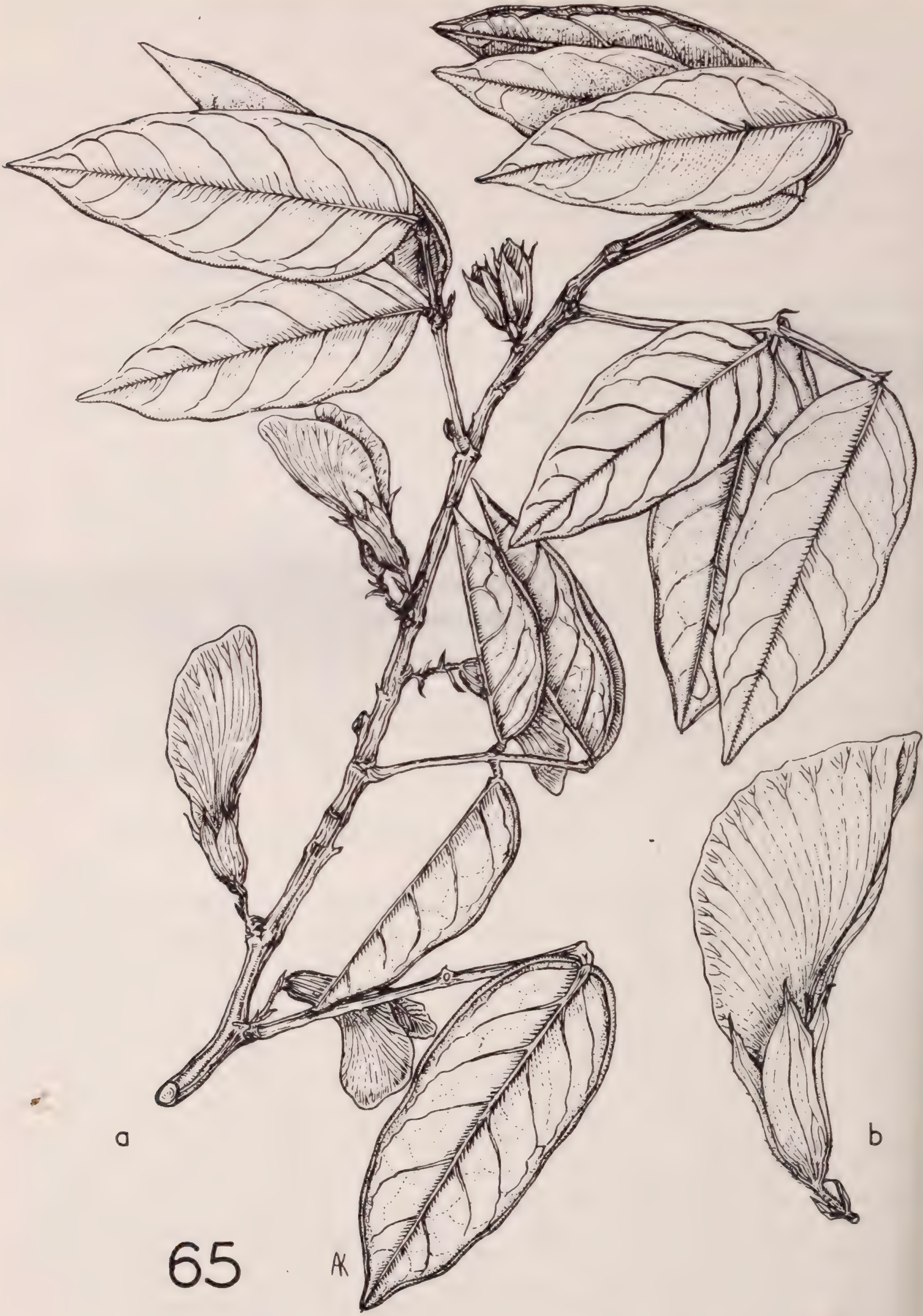

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FIG. 65. *Clitoria cerifera, a,* habit × ½. *b,* one flower enlarged, × 1. based on *Maguire, Wurdack & Bunting* 37580.

glabrae; carinarum petala longo-unguiculata (ca. 20 mm), lamina 15 mm longa et 5 mm lata minute uncinata extus, intus glabra. Staminorum filamenta 38 mm longa, connata per 33 mm, glabrum, antherae 2.5 mm longae, 0.5 mm latae, lineares. Stylus 25 mm longus, ovarium 12 mm longum, 1 mm latum, lineare, sericeum, 15-ovulatum, gynophoro 8 mm longo, piloso. Fructus ignotus.

TYPE: virgate shrub 2 m tall. Calyx reddish; banner pale lilac, basally with fine red-purple lines; keel and wings white; frequent in dry part of savanna on right bank of Río Pacimoni 50 km above mouth, 100–140 m elev., Terr. Amazonas, Venezuela, Feb. 7, 1954, *Bassett Maguire, John J. Wurdack & George S. Bunting 37580* (NY). Paratype: shrub 1.5–2.5 m tall. Occasional in savanna on left bank of Caño Hechimoni 8 km above mouth, 100–130 m elev., Terr. Amazonas, Venezuela, Feb. 1954, *Maguire, Wurdack & Bunting 37635.*

The probable nearest relative of *C. cerifera* is another arborescent species—*C. arborescens.* However, the new species is readily distinguishable by the very different venation of the leaflets, the ceriferous and nearly glabrous undersurfaces of the leaflets, the smaller bracteoles and larger standard.

POLYGALACEAE

Securidaca ecristata Wurdack, sp. nov.

Frutex scandens; ramuli teretes, aeque cum petiolis inflorescentiis pedicellisque modice persistenterque hirsutuli. Folia elliptica vel leviter ovato-elliptica apice acuta vel anguste obtusa basi late acuta vel anguste obtusa sub inflorescentiis 3–5 × 2.5–3.5 cm apud inflorescentias minora, coriacea, marginibus sparsissime hirsutulis leviter revolutis, supra vix nitida vel nitidula costa basi extremaque sparse hirsutula alioqui (marginibus exceptis) glabra subtus manifeste pallidiora sparse vel modice aureo-strigulosa, costa supra impressa subtus elevata, nervis primariis utrinque 7–9 supra et subtus leviter elevata inconspicue laxeque reticulata; petiolus gracilis 5–7 mm longus basi glandulis inconspicuis. Paniculae terminales laxae parvae ramis 2–4 cm longis; bracteae inconspicuae 1–1.5 mm longae valde caducae. Pedicelli 5–6 mm longi. Sepala exteriora ovato-orbicularia extus modice strigulosa ciliolata intus glabra vel ad basim extremum sparse strigulosa; posticum 3.8–4.2 × 3.5 mm; dua antica 3–3.2 × 2.8–3.5 mm; alae ungue 2 mm longo extus glabro vel sparse hirsutulo intus sparse hirsutulo, lamina ovato-orbicularia 5–5.5 × 5.5 mm leviter emarginata ciliata alioqui glabra. Petala lateralia oblonga vel leviter spathulato-oblonga rotundata 6.5–7.2 × 2.5–2.9 mm basim versus sparsissime ciliolata intus parte tertia basali sparse hirsutula alioqui glabra dente laterali inconspicuo; carina tota 6.5–7 mm longa ungue 2–2.5 mm longa ciliata intus marginem basalem versus sparse hirsutula alioqui glabra crista nula (dente parvo simplico ad apicem carinae 0.1–0.3 mm longo). Staminum vagina 5–5.2 mm longa extus marginem versus et per costam hirsutula intus marginem versus parte centralique hirsutula; filamenta libera 0.3–0.5 mm longa; antherae 0.8–1 mm longae ellipticae rotundae. Ovarium glabrum ala strigulosa stipite 0.5–0.7 mm longo; stylus leviter curvatus glaber 4–4.5 × 0.6 mm. Fructus 3.2–3.7 cm longus sparse strigulosus parte seminifera 6–7 mm diametro vix reticulata; ala prima 2–2.8 × 1.3–1.6 cm margine exteriore recta vel vix curvata interiore leviter recurvata; ala secunda subparva 4–7 × 2–3 mm parte 2–4 mm terminali libera.

HOLOTYPE: woody vine, sepals pale purple, keel yellow, cumbre near Summit Camp, Cerro Huachamacari, Río Cunucunuma, Terr. Amazonas, Venezuela, elev. 1800 m, Dec. 6, 1950, *Maguire, Cowan & Wurdack 30009* (NY). Paratypes: woody vine, lvs coriaceous, fls purple-red, occasional in cumbre near Summit Camp,

Cerro Huachamaçari, elev. 1800 m, Dec. 10, 1950, *Maguire, Cowan & Wurdack 30085;* woody vine, sepals purple, keel yellowish, frequent in cumbre near Summit Camp, Cerro Huachamacari, elev. 1800 m, Dec. 15, 1950, *Maguire, Cowan & Wurdack 30251.*

S. ecristata is related to a poorly defined group of ecristate Andean taxa with pubescent ovary wings: *S. atropurpurea* Turcz., *S. dasycarpa* Turcz., *S. densiflora* Lind. & Pl., *S. purpurea* Lind. & Pl., *S. planchoniana* Killip & Dugand, *S. trianaei* Killip & Dugand, and *S. schlimii* Pl. & Lind. ex Tr. & Pl. The first four of these have leaves evenly pubescent above and loosely puberulent below. *S. trianaei* has large flowers; *S. schlimii* has alae prominently strigulose externally, leaves of a different shape, and branchlets with spreading pubescence; and *S. planchoniana* has alae densely strigulose externally and leaves densely rufous-puberulent below. Probably other floral differences exist, but authentic material of all the Andean taxa has not been seen; however, Dr. Cowan examined type material of several species for me at Kew and the British Museum.

Securidaca savannarum Wurdack, sp. nov.

Frutex scandens; rami teretes valde ramulosi aeque cum petiolis inflorescentiis pedicellisque modice albo-hirsutuli. Folia ovato-elliptica vel elliptica apice late acuta vel rotundata basi rotundata vel leviter emarginata, infra inflorescentias 3-5.5 × 2-3.5 cm apud inflorescentias vix minora crasse coriacea marginibus revolutis extremibus sparsissime hirsutulis, supra nitida glabra, subtus conspicue pallidiora modice vel sparse aureo-strigulosa, costa supra leviter impressa subtus prominente, nervis primariis utrinque 6-8 supra leviter expressis vix reticulatis subtus leviter expressis reticulatisque; petiolus 2-3 mm longus robustus basi glandulis corneis 1-1.5 mm diam. vix elevatis praeditus. Racemi axillares inconspicui 1-1.5 cm longi solitarii-terni glandulis corneis 0.5-0.8 mm diam. in rhachibus flores subtendentibus; bracteae parvae 0.6-0.8 mm longae; pedicelli 3-5 mm longi graciles. Sepala exteriora orbiculari-ovata apice rotunda extus per costam aut per partem centralem sparse hirsutula intus modice strigulosa; posticum 2.3-3 × 2 mm; dua antica 2-2.7 × 1.7-2 mm; alae unguis vix distinctus, ala 5-6.5 × 4.4-5 mm glabra eciliata lamina orbiculari-obovata vix emarginata. Petala lateralia oblonga rotunda 5-6 × 1.5-1.7 mm parte media sparse ciliata extus parte media sparse hirsutula intus parte media basique modice hirsutula, dente laterali vix conspicua; carina tota 5.5-6 mm longa glabra eciliata, ungue 2.3-2.9 mm longo, crista pro flore grandi ut plicata 0.7 × 2 mm plus minusve integra vix undulata transverse medieque plicata. Staminum vagina 5-5.5 mm longa extus glabra vel parte dimidia basali sparsissime hirsutula intus parte dimidia basali dense hirsutula; filamenta libera 0.3-0.5 mm longa; antherae 0.3-0.4 mm longae apice rotundae. Ovarium 1-1.2 mm longum inaequaliter bialatum ala minori sparsissime hirsutula vel glabra alioqui glabra stipite 0.2 mm longo, stylo gracili 4.3-4.8 mm longo 0.2 mm lato parte tertia distali curvato (angulo 60°-80°), stigma 0.5 mm latum. Fructus ignotus.

HOLOTYPE: vine in shrubs, fls creamy yellow with lateral petals apically purplish, edge of Savanna No. 1, northwest base of Cerro Yapacana, Alto Rio Orinoco, Terr. Amazonas, Venezuela, elev. 150 m, Mar. 17, 1953, *Maguire & Wurdack 34499* (NY). Paratype: same locality, Jan. 7, 1951, *Maguire, Cowan & Wurdack 30776.*

The leaves of *S. savannarum* are not unlike those of *S. ecristata,* but thicker and more nitid; in flower structure however, there are many differences. Perhaps the closest relative is *S. lateralis* A. W. Benn., which has a similar large carinal crest (vide *A. C. Smith 3170* and *Wilson-Browne 658*); the British Guiana specimens may be distinguished by the thinner leaves with more cordate bases and looser and longer hairs on the lower surface, smaller distinctly elevated petiolar glands, and much larger flowers with alae about 12 mm long. *S. lateralis* was described from a Spruce collection from Manaos. Such a disjunct known distribution is also evident in *S. uniflora* Oort, known from several collections in the Guianas and also from Manaos (*Ule 8886*, fide Sandwith in litt., and *Ducke 1769*, 23-IX-1945).

Securidaca speciosa Wurdack, sp. nov.

Frutex scandens; ramuli teretes, aeque cum petiolis inflorescentiis pedicellisque pilis parvis patentibus modice et persistente induti. Folia elliptico-ovata apice obtusa minute apiculataque basi obtusa vel subcordata in sicco plerumque conduplicata infra inflorescentias 4.5–8.5 × 2.5–6 cm apud inflorescentias minora coriacea marginibus non incrassatis, supra nitida glabra (praeter nervum medium sparse hirsutulum), subtus pallidiora nervo medio persistenter hirsutulo venulis superficieque statu juvenili sparse hirsutulis glabrescentibus, nervis primariis utrinque 6–8 reticulo supra et subtus manifesto; petiolus 3-5 mm longus basi glandulis inconspicuis 0.2 mm diam. Paniculae terminales speciosae ramis 7–45 cm longis; bracteae valde caducae parvae 1.3–1.7 mm longae. Flores purpurei (in sicco albidi). Sepala exteriora late ovata apice obtusa vel rotunda ciliolata extus sparse strigulosa intus glabra, uno postico 4.3–4.8 × 3.3–3.6 mm duobus anticis 3.4–3.8 × 2.8–3.4 mm; alae ovato-orbiculares 11–14 × 8.5–10.5 mm apice leviter retusae, ungue breve, marginibus ciliatis cetero glabris. Petala lateralia obovato-spathulata apice late obtusa 9–10 × 4–5.2 mm intus basim versus sparse hirsutula atque sparse ciliolata extus glabra dente laterali inconspicuo; carina tota 10–11 mm longa ungue 2–3 mm longo ciliolata intus marginem basalem versus hirsutula, crista parva 1 mm alta 2–2.3 mm lata subintegra irregulariter denticulato-crenata. Staminum vagina 6–6.7 mm longa basim versus ciliolata et intus basim marginemque versus hirsutula; filamenta libera 3–3.5 mm longa; antherae 0.8–1.3 mm longae apice acutae vel brevicaudatae. Ovarium aeque cum ala glabra, stylo ad medium aut supra gradatim geniculato (angulo ultimo 90°) glabro 7–10 × 0.6–0.7 mm, stigma 1–1.2 mm latum. Fructus maturus non visus, fructu maxime immaturo toto glabro.

HOLOTYPE: scandent shrub, frequent in open rocky places, Raudal Ouraima, Rio Paragua, Edo. Bolívar, Venezuela, elev. 175 m, Jan. 20, 1952. *Maguire 33152* (NY). Paratype: woody vine with purple fls, riverine woodland at portage, Raudal Ouraima, Dec. 10, 1951 *Maguire 32717*.

S. speciosa is closely related to the widespread *S. diversifolia* (L.) Blake and resembles that species in leaf nervation; the Ouraima species may be differentiated by its glabrous leaf surfaces, somewhat smaller carinal crest, and completely glabrous ovary and ovary wing. In general aspect *S. speciosa* is not unlike *S. marginata* Benth., but the persistent stem pubescence, non-incrassate leaf margins, glabrous ovarial wing, and distinctly cristate keel separate it from that species; the glabrescent branches, smaller leaves, and ecristate keel differentiate *S. retusa* Benth. *S. pendula* Bonpl. (*S. complicata* H.B.K.) differs at least in the pubescent narrower alae and smaller leaves; Bennett in his key in *Flora brasiliensis* cited *S. complicata* as having an ecristate keel, but both the H.B.K. description and type photograph (F13089) indicate the presence of a crest.

BEGONIACEAE[14]

The Begoniaceae are so poorly represented in the Guayana Highland that few conclusions can be drawn from their distribution. However, these few species,

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[14] By Lyman B. Smith and Bernice G. Schubert.

including the novelty described below, all show affinities toward the north rather than with Brazil.

Begonia nubicola Smith & Schubert, sp. nov. (Fig. 65 A.)

Herbacea 1.5–2.5 m alta, omnino glabra; ramis flexuosis, gracilibus, rubris; foliis transversis vel valde obliquis, subellipticis, apice abrupte acuminatis, basi late cordatis, ad 26 cm longis et 11 cm latis margine leviter undulatis, subtus rubro-nervatis, petiolo 4–7 cm longo, stipulis mox deciduis, ignotis; pedunculis axillaribus, ad 9 cm longis; cymis multifloris, valde irregularibus cum ramis alternis elongatis et axin centralem simulantibus, 20 cm longis; bracteis mox deciduis, ignotis; pedicellis masculinis 4–5 mm longis, fructiferis ad 25 mm longis; tepalis masculinis 2, late ovatis, obtusis, basi cordatis, 6 mm longis, roseis; staminibus liberis, antheris oblongis, 0.5 mm longis, quam filamentis subduplo brevioribus, connectivo producto truncato; bracteolis femineis late ovatis, obtusis vel retusis, 5 mm longis, integris, membranaceis; tepalis femineis ignotis; stylis 3, breviter bifidis, ramis stigmatibus spiraliter cinctis, ovario late ellipsoideo, placentis bilamellatis; capsulis inaequaliter trialatis, ala

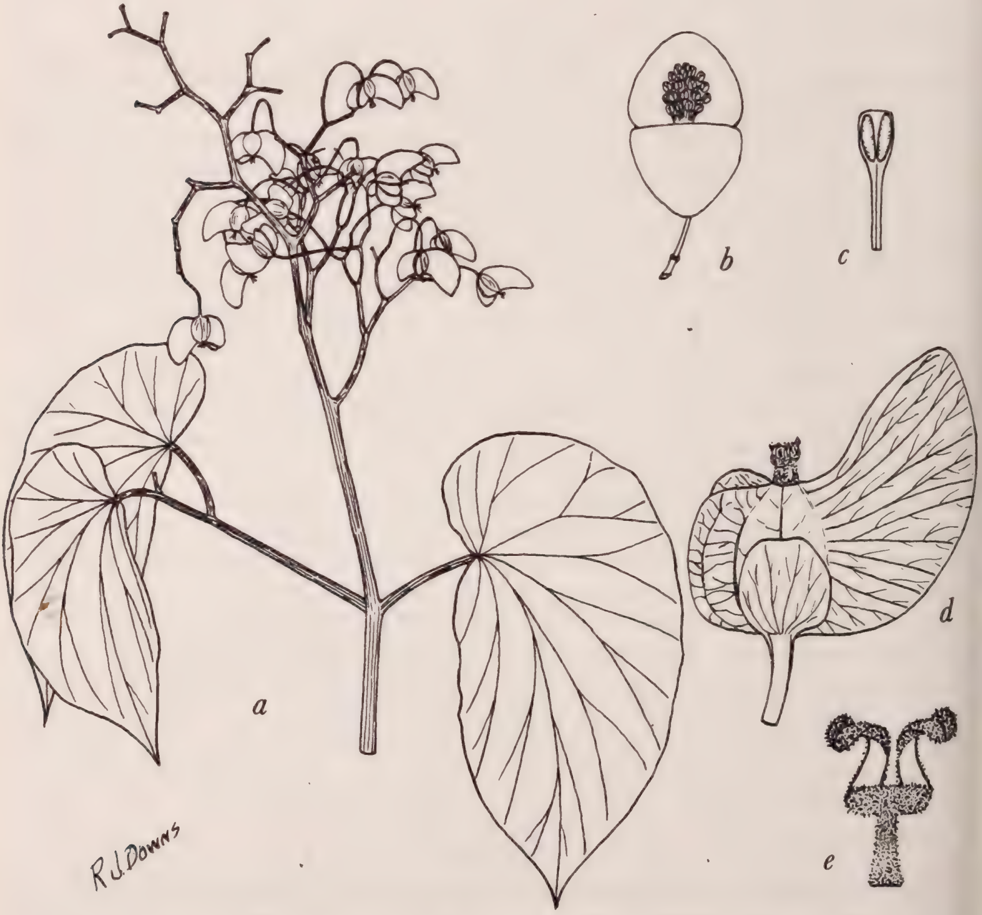

FIG. 65A. *Begonia nubicola* Smith & Schubert. *Maguire, Wurdack & Bunting 36859. a,* leaves and inflorescence, × ¼; *b,* staminate flower, × 2; *c,* stamen, × 10; *d,* young fruit with bracteole, × 2; *e,* style, × 10.

maxima adscendente dolabriforme, acuta, 20–25 mm alta, duobus ceteris marginiformibus vel semiorbicularibus; seminibus ellipsoideis, reticulatis.

TYPE: Herb 1.5–2.5 m high, leaves red-veined beneath, fruit brown; occasional in high montane forest, 2–8 km [from] Camp No. 3 at 800 m alt., Cerro de la Neblina, Río Yatua, Amazonas, Venezuela, December 24, 1953, *B. Maguire, J. J. Wurdack & G. S. Bunting 36859.*

We describe this species with some misgiving because of the complete lack of pistillate tepals. On the other hand, the inflorescence has alternating long and short branching which simulates a geniculate central axis and immediately distinguishes this species from almost all others in South America.

LYTHRACEAE[15]

The following three new species and *Cuphea cataractarum* Koehne belong to the section *Euandra* subsection *Hyssopocuphea* of Koehne's system of this genus. The species can be distinguished in the following key.

Stems and branches with malpighiaceous hairs only.
  Small plants, ± 10 cm in height. Stems slender, branched from the base. *C. rhodocalyx.*
  Plants up to 50 cm in height. Stems erect. Inflorescences long with reduced leaves. *C. pleiantha*
Stems and branches with malpighiaceous hairs and other hairs intermixed.
  Leaves distichous or subdistichous. *C. distichophylla.*
  Leaves decussate. *C. cataractarum.*

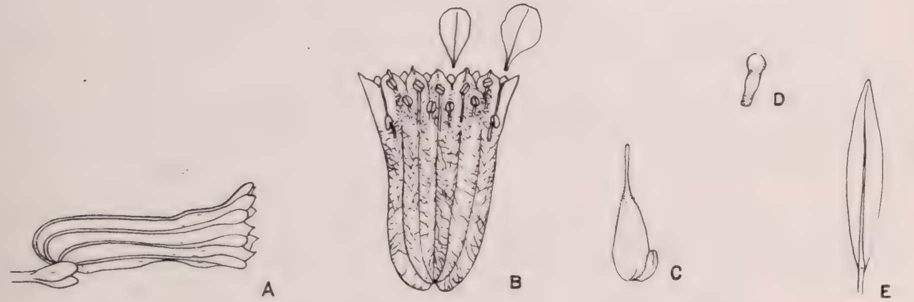

FIG. 66. *Cuphea rhodocalyx* Lourt. A, calyx, × 7; B, the same opened and petals, × 7; C, pistil with the disk, × 7; D, disk, × 10; E, leaf, × 2.5. All from *Bassett Maguire & Bassett Maguire Jr. 29201.*

1. Cuphea rhodocalyx Lourt., sp. nov. (Fig. 66.)

Herbacea, parva (ad 9 cm alta). Rhizoma breve, radicibus tenuibus, fibrosis, confertim ramosis. Caules tenues e basi ramosi, procumbentes. Planta tota cum aliquantula pubescentia adpressa, canoso-malpighiacea vestita, glabrescens. Internodia quam folia breviora (2–3 mm). Folia decussata, cauli propter folia subsessilia decurrentia aspecta 4-alato. Lamina lineari-lanceolata (5–13 × 1–2 mm), acuta; nervo centrali in utraque pagina conspicuo, margine deorsum replicato. Flores alternati in summo ramorum apice, inter folia. Pedunculi ad 0.5 mm apicem versus duobus bracteolis muniti. Bracteolae magnae, crassae, oblongae aut ovatae, acutae 0.5 mm, plus minusve, longae.

Calyx roseo-lilacinus (2.5 mm longus), in fructu ampullaceus, in fauce dilatatus, calcari obtuso vix conspicuo, appendicibus crassis quam lobuli calycini brevioribus, obtusis, glaber aut paucissimis pilis adpressi-malpighiaceis vestitus; intus densissime pubescens in nervis et lanato-pubescens a tergo staminum. Petala 6, lilacina, obovato- aut oblongo-spathulata (1.75–1.5 × 0.6 mm), obtusa. Stamina 11, inclusa, perlonga calici aequantia, duobus dorsalibus brevissimis, episepalicis majoribus, tribus ventralibus glabris, caeteris pubescentibus; antherae magnae, ovoideae. Ovarium semiovoideum (1.5 mm) in parte superiori pubescens. Stylus glaber (± 0.5 mm). Stigma capitatum. Discus carnosus, magnus (ca. 0.6 mm), crassus, oblongus, obtusus, erectus. Ovula 4-7.

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[15] By Alicia Lourteig.

Semina (immatura) suborbicularia, leviter marginata, foveolata.

TYPUS: VENEZUELA: Territorio Amazonas, Cerro Marahuaca, along streams, montane slopes at 1000 m alt., 9 May 1949, *Bassett Maguire & Bassett Maguire Jr. 29201* (NY).

The flowers of this species are very similar to those of *C. dactylophora* with a slight difference in the shape of the disk. On the other hand, its habit is totally different and its pubescence is very slight to almost none.

The name, derived from the Greek, refers to the shade of the calyx.

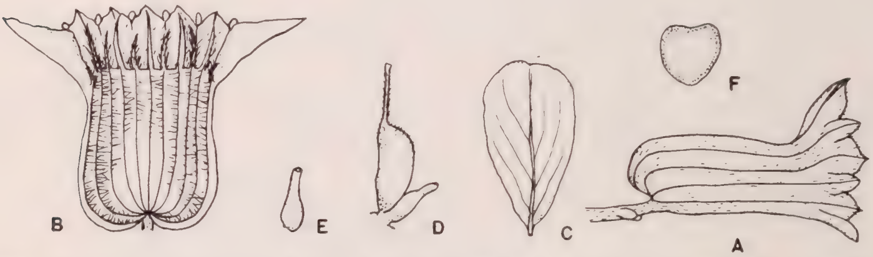

FIG. 67. *Cuphea pleiantha* Lourt. A, calyx, × 5; B, the same opened, × 5; C, petal, × 5; D, pistil with the disk, × 5; E, disk, × 5; F, seed, × 5. All from *Bassett Maguire & C. K. Maguire 35126.*

2. **Cuphea pleiantha** Lourt., sp. nov. (Fig. 67.)

Suffrutex 20–50 cm altus, pubescentia exigua et subtili malpighiacea munitus, plus minusve glabrescens. Rhizoma sublignosum (circiter 1 cm diam.).Caules sublignosi dichotome ramosi; rami ascendentes, rubescentes, valde foliati. Internodia quam folia valde breviora (3–6 mm). Folia decussata, sessilia, lanceolata (12–40 × 2–6 mm), subacuta, nervo centrali in utraque pagina conspicuo, margine deorsum replicato, supra glabra, subtus exigua malpighiacea pubescentia munita. Flores alternati in longis gracillimis inflorescentiis dispositi folia ovato-lanceolata aut oblonga, reducta ad 2–5 × 2 mm gerentes; pedunculi (1-3 mm) crassi, infrapetiolatibus, glabris aut subglabris, apicem versus duobus bracteolis munitis. Bracteolae rubescentes, crassae, oblongae aut ovatae (0.5-0.6 mm), acutae, paene glabrae.

Calyx (5.5–6 mm) purpureus, cum paucissimis subtilibus malpighiaceis pilis vestitus, tubi plus minusve recti in fauce ampliati, calcari vix conspicuo, obtuso, lobulis dorsalibus majoribus, appendicibus intersepalicis brevioribus, subtiliter ciliatis; intus a tergo staminum lanato-pubescens et infra stamina in nervis dorsalibus subtiliter pubescens et in caeteri nervis inconstanter pubescens. Petala 6, albido-purpurea, oblongo- aut obovato-spathulata (4-5 × 2.5-3 mm), obtusa, interdum aliquot pilos ad basim gerentes. Stamina 11, filamentis latis, duobus dorsalibus brevissimus, episepalicis majoribus, margini calycis aequantia, tribus ventralibus glabris, caeteris lanato-pubescentibus. Pistillum margini calycis aequans et post anthesim ei superans. Ovarium semiovoideo-asymmetricum, subtiliter pubescens, in stylum pubescentem attenuatum. Stigma subcapitatum. Ovula 7–9. Discus crassus, magnus (1.25 mm), ascendens, cylindrico-conicus, obtusus.

Semina 6–9 (inmatura) suborbicularia, complanata, leviter marginata, vix retusa, subtilissime foveolata.

TYPUS: VENEZUELA: Territorio Amazonas, Serranía Yutaje, Río Manapiare, right branch of Caño Yutaje, alt. 1300 m, 9 II 1953, *Bassett Maguire & C. K. Maguire 35126* (NY).

Additional collections: *Maguire & Maguire 35102, 35246, 35376,* all from Serranía Yutaje.

This species is related to *C. dactylophora,* showing a very similar disk. However, there are some differences in the flowers, such as the greater length of the pistil, the fact that the stamens are not strictly included, and the slight hairiness inside the calyx. They differ also in their habit, which in this new species is a very characteristic one with long, conspicuous inflorescences, as well as in the very scanty pubescence on the leaves and the calyx.

The name, derived from the Greek, refers to the long, many-flowered inflorescences.

3. **Cuphea distichophylla** Lourt., sp. nov. (Fig. 68.)

Suffrutex ad 30 cm altus. Rhizoma sublignosa. Radices ramosae, fibrosae. Caules erecti vel procumbentes (ad basim usque 4 mm diam.), ramosi, pubescentia canoso-malpighiacea et vix cum pilis glandulosis subtilibus, longis, purpureis, intermixta. Internodia brevissima (1–4 mm). Folia confertissima, disticha, subdisticha aut raro pro parte decussata, ascendentia, rigida, subsessilia, discoloria; petioli valde breves, crassi, purpurei, pubescentes. Lamina lanceolata aut lanceolato-linearis (10–18 × 1.5–3 mm), acuta, nervo centrali lato, subtus conspicuo; margine deorsum replicato. Flores alternati pedunculis infrapetiolaribus (± 2 mm), purpureis, pubescentia simili caulinae munitis, apicem versus duobus bracteolis munitis. Bracteolae ovatae, malpighiaceo- et glanduloso-pubescentes.

Calyx parvus (4.5–5 mm), purpureus, calcari obtuso, valde canoso-malpighiaceo-et hispido-purpureo-glanduloso-pubescens, appendicibus intersepalicis lobulis

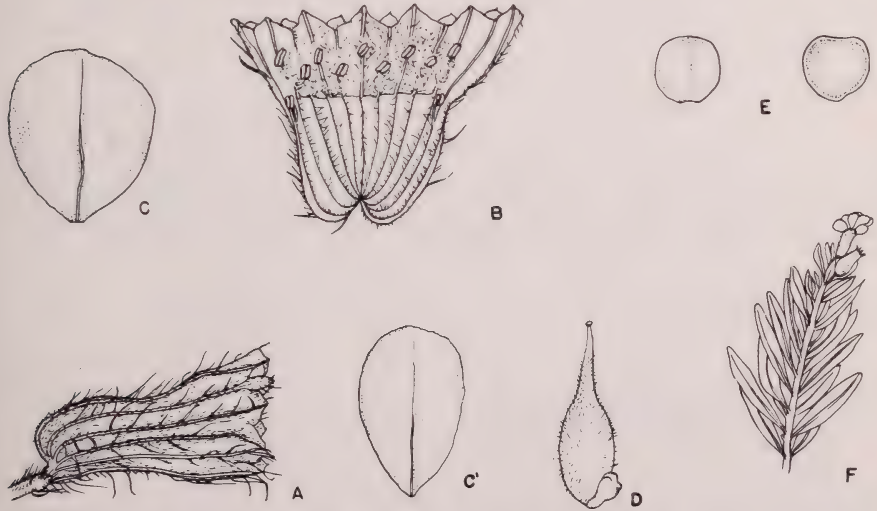

FIG. 68. *Cuphea distichophylla* Lourt. A, calyx, × 5; B, the same opened, × 5; C, dorsal petal, × 5; C', ventral petal, × 5; D, pistil with the disk, × 5; E, seed, dorsal and ventral views, × 5; F, upper part of a branch, × 1. All from *Bassett Maguire 27765.*

similibus, setosis; intus a tergo staminum dense lanato-pubescens atque in omnibus nervis. Petala 6, purpurea, obovata aut oblonga, spathulata (3.5–5 × 2–3 mm) interdum nervo centrali pilosa, dorsalia latiora. Stamina 11, inclusa, ad medium longitudinis calycis inserta, duobus dorsalibus brevissimis, episepalicis majoribus, tribus ventralibus glabris, caeteris lanato-pubescentibus. Ovarium semiovoideum, asymmetricum, parvum (± 1 mm), pubescens. Ovula 2–3. Stylus crassus, inclusus (1–1.25 mm), pubescens. Stigma subcapitatum. Discus carnosus, crassus, subhorizontalis aut ascendens (± 0.6 mm), obscure lobulatus. Semina suborbicularia, castanea (1.5–1.6 mm), leviter marginata, foveolata.

TYPUS: VENEZUELA: Territorio Amazonas, north Savanna, Cerro Sipapo (Paraqué), alt. 1400 m, 17 December 1948, *Bassett Maguire & L. Politi 27765* (NY).

Additional collections: *Bassett Maguire & L. Politi 28217, 27646,* also from Cerro Sipapo.

The name, derived from the Greek, refers to the peculiar disposition of the leaves.

4. Cuphea cataractarum Koehne.

Río Cunucunuma, Río Orinoco, Terr. Amazonas, Venezuela, *Maguire, Cowan & Wurdack 29496, 30348; Curran 176.* Known only from the region of the Río Cunucunuma.

The stems, leaves, and calyx are all covered with very fine and quite appressed malpighiaceous hairs which are whitish.

7. Cuphea anisoclada Lourt., sp. nov. (Fig. 69)

Suffrutex sublignosus (50–60 cm altus), pubescens, glabrescens. Radices ramosae, fibrosae. Rhizoma sublignosum. Caules complures, rufescentes, erecti aut ± decumbentes (± 2 mm diam., 5 mm ad basim), ad apicem ramosi, pilis canoso-malpighiaceis, ramis valde inaequalibus, plus minusve adpressis, et paucis pilis simplicibus vestiti. Internodia (ad 18 mm longa) quam folia breviora. Folia decussata, subsessilia (petiolis crassis, usque ad 1 mm longis), ascendentia, elliptica aut oblonga (15–23 × 4–7 mm), coriacea, acuta, mucronata, vix cordata, nervis supra conspicuis, centrali subtus prominenti, margine deorsum vix replicato (nunc ciliato); pubescentia in ambobus paginis canoso-malpighiacea, supra nervo in pagina inferiore copiosior, glabrescens. Flores alternati. Bracteolae ovatae aut suborbiculatae (0.6–1 mm), pubescentes et ciliatae.

Calyx calcaratus (11–12 mm), calcari rotundato, incurvato, fauce paullo ampliato, dense hirsuto-glanduloso- et malpighiaceo-pubescens, appendicibus intersepalicis quam lobuli brevioribus; intus a tergo staminum lanato-pubescens et infra stamina pubescens in nervis, magis basim versus. Petala 6, lutea (?), oblongo aut obovato-subspathulata (5–6 × 2–2.5 mm) duo ventralia majora (± 7 × 3 mm), obtusa. Stamina 11, duobus dorsualibus brevissimis, inclusa, aut vix calyci

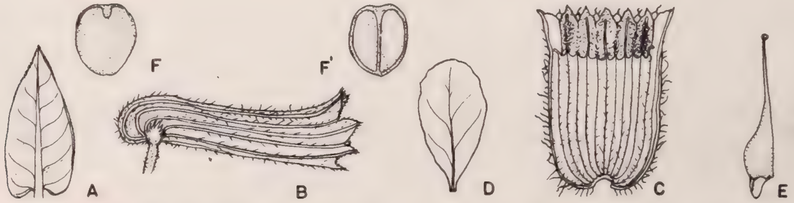

FIG. 69. *Cuphea anisoclada* Lourt. A, leaf, × 1; B, calyx, × 3; C, the same opened, × 2; D, petal, × 3; E, pistil with the disk, × 3; F, seed, dorsal view, × 3; F , the same, ventral view. A-D from *Bassett Maguire 33644;* E-F from *Cardona 1783.*

aequantia, episepalica longiora, e quibus tria ventralia glabra, caetera lanato-pubescentia, intersepalica pubescentia. Discus carnosus, crassus, deflexus. Ovarium (± 2.5 mm) semiovoideo-asymmetricum, 3-ovulatum, glabrum in stylum attenuatum. Stylus tenuis, glaber, inclusus (± 4.5 mm). Stigma subcapitatum, papillosum. Semina 3, magna (± 3 mm), suborbicularia aut subellipsoidea, crassa, carunculata, foveolata.

TYPUS: VENEZUELA: Edo. Bolívar, Gran Sabana, headwaters of Río Aponguao, alt. 1200 m, 27–28 March 1952, *Bassett Maguire 33644* (NY).

Additional collections: VENEZUELA: Río Caroni, playas arenosas del raudal Kurukuya, alt. 740 m, *F. Cardona 1783*, 9 X 1946 (US).

In the system of Koehne for this genus, the present new species must be placed in section *Trispermum*, series 3, immediately after *C. flava* Sprengel, from which it differs in the pubescence and the shape of its leaves.

The name, derived from the Greek, refers to the malpighiaceous hairs whose branches are very unequal in length.

BIGNONIACEAE[16]

This is my twenty-first contribution to the study of the tropical American representatives of this family. For references to the others, see Kew Bull. 1954: 597 (March 1955). In this contribution, the taxa are arranged alphabetically, both by genera and species.

Anemopaegma parkeri Sprague.

VENEZUELAN-BRAZILIAN frontier: between Estado Bolívar (Venezuela) and Territorio do Rio Branco (Brazil): shrub 1–2 m tall with cream-white flowers, on rocky knoll on savanna 5 km south-east of Serra Sabang, 720 m, fl. Dec. 1954, *B. Maguire & C. K. Maguire 40282.* Amazonian Brazil, Guiana. Not recorded for Venezuela. This is a habitat form with erect growth.

Anemopaegma robustum K. Schum.

VENEZUELA: Territorio de Amazonas: woody vine with sulphur-yellow flowers, along uppermost Río Yatua above mouth of Río Yacibo, 100–140 m, fl. Jan. 1954, *B. Maguire, J. J. Wurdack & G. S. Bunting 37440.* British Guiana. First record for Venezuela.

Arrabidaea brachypoda (DC.) Bur.

A. platyphylla (Cham.) Bur. et K. Schum., non *A. platyphylla* DC.

VENEZUELA: Bolívar: shrub 0.5–1 m, with pink fls., infrequent in lower slope forest along Fundación Road, 325–415 m, Feb. 27th 1953, *J. J. Wurdack 34428.* Without data, comm. 1926, *Pittier 12048.* These are the first specimens I have seen from Venezuela. This variable species has a wide distribution in South America, from British Guiana to Brazil, Paraguay, Amazonian Bolivia, and Peru.

Arrabidaea nigrescens Sandw.

VENEZUELA: Territorio de Amazonas: woody vine on ground, fls. pink, at edge of Sabanita 1 km east of Maroa, Rio Guainía, 125 m, April 16th 1953, *B. Maguire & J. J. Wurdack 35703.*

A form with old, thick, glabrescent leaflets, shining and sub-bullate above, and with relatively few forked hairs on the main nerves beneath. A very similar condition is shown by two other collections, *Schultes and Pires 9114* from the Rio Vaupés, and *Holt and Blake 595* from the Rio Negro, both localities being in Brazil. This is the first record from Venezuela, the species being known also from British Guiana and Suriname as well as from Amazonian Brazil.

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[16] By N. Y. Sandwith.

Arrabidaea trailii Sprague; Sandwith, Kew Bull. 1953:461. Jan 1954.

VENEZUELA: Bolívar; high-climbing woody vine, spectacular in flower, calyx dull red, corolla deep red, southwestern-facing slopes of Chimantá-tepuí, above valley of Río Tirica, 1000–1700 m, May 16, 1953, *J. A. Steyermark 75421.* Amazonian Brazil. The first record for Venezuela.

A very robust climber with large leaflets and dense trusses of small, deep red corollas. The fruit and seeds may now be described from the material of *Steyermark 75421* and Herb. Jard. Bot. Rio de Janeiro 35630 (coll. Ducke): *capsule* narrowly elongate-linear, narrowed to the apex, up to 27 cm long, 1–1.2 cm broad, the valves densely minutely lepidote, with somewhat thickened margins and conspicuously raised, thin and sharp, median nerve; *seeds* traversely oblong, 8–9 mm long, 3–4 cm broad, the body dark brownish-lead-coloured, the wings membranous and whitish-hyaline.

Digomphia densicoma (Mart. ex DC.) Pilger.

I have by now studied 24 gatherings of this species, which apparently has a wider distribution than *D. laurifolia,* being found at altitudes of from 500 to 2100 m in the Upper Mazaruni River region of the Pakaraima Mts. in British Guiana, in Venezuela (on the tepuís of Estado Bolívar, apparently less common than *D. laurifolia;* on the cerros of Territorio de Amazonas, evidently much more frequent than *D. laurifolia*), and also in northwestern Amazonian Brazil and in Amazonian Colombia where *D. laurifolia* has not yet been collected. As with *D. laurifolia* there is remarkable variation in the size and shape of the leaflets, and in the size of the calyx and capsule. Moreover, the species varies in habit, from a small shrub of 3 ft to a forest tree 50–80 ft high with a trunk 1–1½ ft in diameter. Nevertheless, I am unable to distinguish any of the specimens even as a variety, much less as a distinct species. Variation in the leaflets between individuals from one small area is particularly well shown in the four collections from the Cerro Sipapo (Paráque). Specimens from the eastern end of the range, in British Guiana, have the largest and broadest leaflets, while those at the western end, in Amazonian Colombia, have leaflets of the smallest and narrowest type. The color of the corolla varies from lavender or light pink to white. In my account of this family in Dr. Steyermark's "Contributions to the flora of Venezuela"* I referred his Ptari-tepuí material to *D. densicoma* with some doubt, but the difficulty of the calyx character is now cleared up by the numerous recent collections from so many localities. The calyx is at first entire, and then splits bilaterally into 2 or sometimes 3 broad lobes. At this stage the pressed calyx sometimes appears spathaceously split down one side only. Later, the two broad lobes become themselves deeply divided, so that eventually there are four subequal lobes. When there are three original lobes, the third of these remains undivided with the result that there are five subequal lobes at the final stage. *D. densicoma,* which is presumably the ancestor of *D. laurifolia,* is always distinguished from it by the pinnate leaves and by the relatively longer and narrower, less elliptic, capsule.

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*Unpublished as this goes to the printer.

Digomphia laurifolia Benth.

I have by now seen 22 gatherings of this species, from British Guiana (Roraima and Upper Mazaruni River districts) and Venezuela (tepuís and cerros in Estado Bolívar and Territorio de Amazonas, often locally common), in habitats varying from altitudes of 125 m (Cerro Yapacana, Terr. Amazonas, Venezuela) to 2500 m (summit of Carrao-tepuí). There is a good deal of variation in the size and shape of the leaves, sometimes even on the same gathering, in the development of the inflorescence and its indumentum (the pedicels and calyx are usually glabrous, but may be more or less copiously sprinkled with gland-tipped trichomes), and in the size of the calyx and corolla, but I see no reason for distinguishing more than a single species in the material. This is a small shrub with simple leaves and lavender-colored flowers, growing to a height of 15 ft, but usually much smaller and often less than 3 ft high. For further notes on this species, and a description of the capsule and seeds, see my contribution to Dr. Steyermark's "Contributions."

Distictella monophylla Sandwith, sp. nov.

Ab omnibus speciebus adhuc cognitis habitu fruticoso haud scandente, foliis simplicibus in forma typica subtus crasse reticulatis aerolis foveolatis pilosulo-tomentellis statim distinguitur.

Frutex ad 3 m altus, virgatus, haud scandens, pauciramosus; rami dense subadpresse pubescentes vel tomentelli; internodia 0.8–3 cm longa. *Folia* simplicia, elliptica, elliptico-oblonga, oblonga, vel elliptico-ovata, apice obtusa vel rotundata, nonnunquam emarginata vel mucronata, basi rotundata vel obtusa, nonnunquam plus minusve cordata, 3–9 cm longa, 1.8–5.7 cm lata, rigide crasse coriacea marginibus revolutis, supra glabra (rarius costa minute pubescenti, pagina sparse pubescenti) nitida punctato-lepidota necnon glandulis patelliformibus immersis prope costam praecipue basin versus praedita creberrime rugosula vel rarius laevia costa nervis venulis planis conspicue reticulatis vel nonnunquam obscuris ac impressis, subtus pilosulo-tomentella nervis venulisque intricatissime reticulatis venulis insigniter crassis nonnunquam glabris aerolas pilosulas velut foveas cingentibus, nervis primariis utroque costae latere vulgo 6–7 sursum arcuatis atque prope marginem anastomosantibus, nonnunquam (in foliis basi cordatis) basi plus minusve quinquenervia vel septinervia; petiolus 3.5–10 mm longus, basi inferne tumido-incrassatus ac in ramum decurrens, indumento ramorum praeditus. *Inflorescentia* apice ramulorum terminalis vel axillaris, racemosa, brevis, ad 5 cm longa, satis pauciflora vel etiam uniflora, passim indumento ramorum praedita; bracteae bracteolaeque deciduae, ad 1.5 mm longae; pedicelli circiter 1 cm longi, nonnunquam sub fructu ad 1.5 cm elongati, infra medium vel etiam prope basin bracteolati. *Calyx* more generis campanulatus, apice integer, 4.5–10 mm longus, ad 10 mm latus, tomentellus, consociebus glandularum praeditus. *Corolla* alba, campanulato-infundibuliformis, extra basi cylindrica excepta tomentosa, saepe curvata, 3.5–7 cm longa, tubo apicem versus ad 2.5 cm lato intus sub insertione staminum zona pilorum densissima praedito praeterea supra zonam usque ad apicem papilloso-pubescenti atque glanduloso-lepidoto, limbo 2.5–6 cm diametro lobis intus pubescentibus. *Stamina* glabra, longiora 2.5 cm breviora 1.8 cm longa; antherae divaricatae, 4–4.5 mm longae; staminodium 5 mm longum. *Discus* pulvinatus, 1.5 mm longus. *Ovarium* ellipsoideum, tomentellum, compressum, sulcatum, ovulis pro loculo 4-seriatis; stylus 2.5–3 cm longus, tomentellus, stigmatibus ellipticis ad 6 mm longis atque 3 mm latis. *Capsula* forma generis typica, elliptica vel oblongo-elliptica, apice acumi-

nata, 4–8.5 cm longa, 2–3 cm lata, tomentella, rugosula, glandulis patelliformibus immersis notata, costa valvarum mediana haud vel aliquantum elevata. *Semina* ad 1.5 cm longa, ad 2.7 cm lata, embryone brunnea vel purpurascenti, alis membranaceis subhyalinis pallide brunneis necnon saturatius maculatis.

TYPE: VENEZUELA: Territorio de Amazonas: Cerro Sipapo (Paráque), frequent in savanna, Camp Savanna, 1500 m, fl. and fr. Dec. 15th 1948, *B. Maguire & L. Politi 27717* (Kew).

VENEZUELA: Amazonas: Cerro Sipapo, on slopes, 1650 m, fl. Dec. 20th 1948, *Maguire & Politi 27799* (Kew); *ibid.*, 1500 m, fr. Jan. 19th 1949, *Maguire & Politi 28450* (NY); *ibid.*, Lower Caño Negro, 1400 m, fl. Dec. 25th 1848, *Maguire & Politi 27898* (NY); Cerro Yapacana, Río Orinoco, frequent in cumbre, 1200 m, fl. and fr. Jan. 3rd 1951, *B. Maguire, R. S. Cowan & J. J. Wurdack 30662* (Kew); Río Guainía, infrequent in sabana El Venado, left bank of Caño Pimichín above Pimichín, 140 m, fl. April 14th 1953, *B. Maguire & J. J. Wurdack 35577* (Kew).

COLOMBIA: Río Atabapo: frequent in savanna 1 km west of Cacagual, fl. and fr. Nov. 19th 1953, *B. Maguire, J. J. Wurdack & G. S. Bunting 36272* (Kew).

Distictella monophylla var. **laevis** Sandwith, var. nov.

A planta typica (var. **monophylla**) ramulis glabratis, foliis utrinque laevibus haud reticulatis subtus glabris crebre punctato-lepidotis differt.

TYPE: VENEZUELA: Territorio de Amazonas: Cerro Yapacana, Río Orinoco, 100–125 m, fl. *Jan. 1951, Maguire, Cowan & Wurdack 30788* (NY).

Also same data, same collectors *30569* (NY).

This is a very interesting and remarkable species, outstanding in the genus on account of its habit and simple leaves. It will be noticed that the specimens with smooth and glabrous foliage, which I have ventured to treat as a variety *laevis*, came from a locality at a low altitude below the mountains. Nevertheless, the typical var. *monophylla*, with leaves strongly reticulate and hairy beneath, can also occur at low altitudes, as is proved by *Maguire & Wurdack 35577*. I have seen only two, quite poor, specimens of var. *laevis*, and further collections of it may persuade me to revise its status.

Distictella obovata Sandwith sp. nov.

D. cuneifoliae (DC.) Sandw. atque verosimiliter *D. monophyllae* Sandw. affinis, ab illa foliolis subtus tomentellis nervis lateralibus paucioribus propius ad marginem anastomosantibus, ad hac habitu scandente foliis bifoliolatis nonnunquam cirrhiferis foliolis plus minusve obovatis venulis subtus minus crasse reticulatis differt.

Frutex scandens, ramulis teretibus subadpresse pubescentibus; internodia 3–6 cm longa. *Folia* bifoliolata, nonnunquam cirrho apice trifurcato terminata; petiolus 0.8–1.5 cm longus, pubescens; petioluli 0.6–1.2 cm longi, supra profunde canaliculati, pubescentes; foliola obovata, obovato-elliptica vel oblanceolata, apice obtusa rotundata vel obtuse acuta, basi attenuata acute cuneata, 2.8–9 cm longa, 1.5–4 cm lata, rigide coriacea marginibus revolutis, supra pilis minutis sparsis regulariter pubescentia nitida punctato-lepidota rugosula nonnunquam subbullata costa nervisque planis vel canaliculato-immersis venulis haud cernendis, subtus glaucescentia tomentella costa nervisque prominentibus venulis prominulis intricate reticulatis sed neque valde crassis neque super tomento pilorum elevatis, basi trinervia praeterea nervis primariis utroque costae latere circiter 4 sursum arcuatis atque prope marginem ipsum anastomosantibus. *Inflorescentia* axillaris atque terminalis, racemosa, ad 15 cm longa, laxiflora, ubique pubescens; bracteae bracteolaeque deciduae, bracteolae vix 1 mm longae; pedi-

celli 1.3–2.7 cm longi, satis graciles, minute pubescentes, prope medium vel saltem longe supra basin bracteolati. *Calyx* campanulatus, apice integer, 8–9 mm longus, ad 1 cm latus, tomentellus, consociebus glandularum praeditus. *Corolla* alba, campanulato-infundibuliformis, extra basi cylindrica excepta tomentosa, saepe curvata, 4–5 cm longa, tubo apicem versus ad 2 cm lato intus sub insertione staminum zona pilorum papilliformium densissima praedito praeterea supra zonam usque ad apicem papilloso-pubescenti atque glanduloso-lepidoto, limbo 3–4 cm diametro lobis intus pubescentibus. *Stamina* glabra, longiora 2.1 cm breviora 1.7 cm longa; antherae divaricatae, 3.5–4 mm longae; staminodium 5 mm longum. *Discus* pulvinatus, in apicem conico-elevatum contractus, 2 mm altus. *Ovarium* ellipsoideum, tomentellum, compressum, sulcatum, ovulis pro loculo 4-seriatis; stylus tomentellus, superne glabrescens, 3 cm longus. *Capsula* et semina non visa.

TYPE: BRITISH GUIANA: Upper Mazaruni River; Kataima, 500 m, in scrub savanna, fl. Nov. 17th 1951, *B. Maguire & D. B. Fanshawe 32637* (Kew).

Also same data, same collectors *32637A* (NY).

32637 is noted as a vine or bushy rope, with leaves glaucescent beneath, calyx glaucous green, fls. white. This collection shows no tendrils and relatively large and narrower, more or less oblanceolate leaflets, whereas no. *32637A* has smaller, obovate leaflets, often accompanied by tendrils.

This material seems to lie between the shrubby simple-leaved species which I have just described and the rarely collected species of Pará and French Guiana, *D. cuneifolia,* for which the necessary new combination was made recently in Kew Bull. 1953:476 (Jan 1954) *D. cuneifolia* was previously outstanding in the genus on account of the shape of its small glabrous, lepidote leaflets. It is obvious that the validity of all these taxa needs testing by extensive field-work. For instance, can *D. monophylla* produce scandent forms with bifoliolate leaves (approximating to *D. obovata*) in the same locality, and can *D. obovata* produce forms with glabrous leaflets and more numerous lateral nerves (approximating to *D. cuneifolia*)? Again, *D. parkeri* (DC.) Sprague & Sandw. and *D. pulverulenta* Sandw. may eventually be regarded as mere indumentum varieties of *D. racemosa* (Bur. & K. Schum.) Urb., which itself may be reduced to *D. magnoliifolia* (H.B.K.) Sandw. It is significant that the floral characters of all these plants seem to be essentially the same, apart from minor differences of measurement, nor does it seem probable that the fruits and seeds will afford good taxonomic distinctions.

Distictella pulverulenta Sandw.

VENEZUELA: Bolívar: woody high climber, calyx dull lavender, corolla orchid in upper half, whitish below, in rich forest, vicinity of Base Camp, near Río Tirica, lower southwestern slopes of Chimantá-tepuí, 1000 m, May 24 1953, *J. A. Steyermark 75554*. Southern border of British Guiana, French Guiana, and Amazonian Brazil. The first record for Venezuela.

Potamoganos microcalyx (*G. F. W. Mey.*) Sandw.

Micropaegma cupulatum "(Splitg.)" M. Pichon, Bull. Soc. Bot. Fr. 92:225. 1945.

VENEZUELA: Territorio de Amazonas: liana with purple fls., Río Cuao, Río Orinoco, 125 m, Jan. 1949, *B. Maguire & L. Politi 28436;* vine with purple fls., on rain forest slope, Cerro Huachamacari, Rio Cunucunuma, 400 m, Dec. 1950, *B. Maguire, R. S. Cowan & J. J. Wurdack 29973.*

Hitherto known only from British Guiana and Suriname. The fruits and seeds of this genus are still unknown.

M. Pichon's new genus *Micropaegma* is unfortunately abortive, as its type species is *M. "brachycalyx* (Klotz.)" Pichon, based on *Bignonia brachycalyx* Klotzsch = *Anemopaegma brachycalyx* Bur. & K. Schum. That species, as I showed many years ago, in Rec. Trav. Bot. Néerl. **34**:216, 218 (1937), is conspecific with *Mussatia prieurei* (DC.) Bur. ex K. Schum. At the same time (p.222), I showed that *Anemopaegma cupulatum* Bur. & K. Schum., as to their description, was identical with *Potamoganos microcalyx*, its queried basonym, *Bignonia cupulata* Splitg., being a synonym of *Petastoma patelliferum* (Schl.) Miers.

Pyrostegia dichotoma Miers ex K. Schum.

VENEZUELA: Territorio de Amazonas: woody vine with bright orange fls., along river near mouth of Caño Manariche, Alto Río Orinoco, 150 m, March 29th 1953, *B. Maguire & J. J. Wurdack 34754*. Hitherto known only from Amazonian Peru and Brazil.

Pyrostegia venusta (Ker-Gawl.) Miers.

VENEZUELA: Bolívar: vine 2–5 m, climbing in shrubs, occasional between Upata and Carhuachi along main highway west of Upata, 150–300 m, fl. and fr. April 29th 1955, *J. J. Wurdack & F. W. Wright 406*. Brazil, Paraguay, northeastern Argentina, and Bolivia.

Commonly cultivated in many parts of tropical America. Apparently the first record for Venezuela (but planted, or an escape, in this locality?).

Tabebuia insignis (*Miq.*) Sandw. var. **orinocensis** Sandwith, var. nov.

Juxta var. *insignem* atque var. *monophyllam* Sandw. ponenda necnon ulterius comparanda, foliis 1–3-foliolatis, foliolis pro rata satis parvis lateralibus basi sessilibus obliquis inaequilateris junioribus subtus nonnunquam velutino-lanato-tomentosis, capsulis pro rata latis, alis seminum pro rata longis notabilis.

Shrub, nearly leafless at the time of flowering. *Leaves,* when 1-foliolate, with a short petiole 1–3 cm long, the lamina attached without an evident petiolule to a joint at the swollen apex of the petiole, elliptic, very shortly broadly obtusely acuminate at the apex, attenuate to the cuneate base, 6–13 cm long, up to 4.5 cm broad, coriaceous, when very young sometimes wooly-tomentose and velvety beneath, copiously lepidote on both surfaces, otherwise glabrous, main lateral nerves about 7 on each side of the midrib, arcuate-ascending; 3-foliolate leaves with petioles 4 cm or more long, and with sessile lateral leaflets which are conspicuously oblique and unequal-sided at the base, the terminal leaflet with a petiolule up to 1.5 cm long, the leaflets with measurements not exceeding those of the 1-foliolate leaves. *Calyx* 1.2–1.7 cm long, about 1 cm broad, unequally and irregularly lobed, more or less lepidote, eglandular. *Corolla* white, the tube and throat yellow within, the hairs on the anterior inner side of the tube short and stiff. *Capsule* rostrate-acuminate at the apex, 10–15 cm long, 1.3–2 cm broad. *Seeds* up to 4 cm broad, the body greyish, the wings membranous, white and hyaline-shining, 1.4–1.7 cm in length (i.e. in relation to the axis of the body).

VENEZUELA: Territorio de Amazonas: locally frequent on *laja* on Isla Raton, Río Orinoco, between Sanariapo and San Fernando de Atabapo, 120 m, fl. and fr. Feb. 1954, *B. Maguire, J. J. Wurdack & G. S. Bunting 37701* (Kew).

VENEZUELA: Amazonas: frequent on crystalline *laja* 1–1.5 km east of Hotel Amazonas, Puerto Ayacucho, 100–120 m, fl. and fr. Feb. 1954, *Maguire, Wurdack & Bunting 37702;* in open scrub savanna on white sand, Cerro Sipapo (Paráque), 200 m, fr. Feb. 1949, *B. Maguire & L. Politi 28977* (NY). Bolívar: Río Orinoco, in thin scrub savanna on rounded granite outcrop 10–15 km below La Urbana at Caño Sambolje, 100 m, fl. and fr. March 1949, *B. Maguire & B. Maguire Jr. 28993.*

This interesting taxon may deserve a higher rank but, for the present, I cannot separate it as more than a distinctive edaphic and perhaps geographic variety of a polymorphic species *T. insignis*, to which I have already reduced *T. longipes* Baker as var. *monophylla;* also suggesting (in Dr. J. A. Steyermark's "Contributions to the Flora of Venezuela") that *T. roraimae and T. dura* (Bur. & K. Schum.) Sprague & Sandw. are quite probably habitat and, at least in the instance of *T. roraimae,* altitude forms or varieties of the same species. The unifoliolate leaves of the collection *28993* cited above are velvety-tomentose beneath, while some of those of *37702* are also very distinctly pubescent on the lower surface. Of the material seen by me only the type collection shows both unifoliolate and 3-foliolate leaves, but *37702* is noted on the label as bearing 1-3-foliolate leaves.

Tabebuia insignis (Miq,) Sandw. var. **pacimonensis** Sandwith, var. nov.

Inter varietates ceteras foliis brevipetiolatis unifoliolatis rigide coriaceis oblanceolatis, nervis lateralibus supra impressis subtus planis usque ad nervum marginalem rectis nec arcuatis notabilis.

Shrub or small tree. *Leaves* crowded on the very short (1–2 cm) young wood terminating the branchlets, unifoliolate, with petiole 1–1.5 cm long, swollen and jointed at the apex at the junction with the lamina which is oblanceolate, shortly, broadly and obtusely cuspidate-acuminate at the apex, long cuneate-attenuate to the base, 8–13 cm long, 3–4.2 cm broad, stiffly coriaceous with revolute margins, the midrib thin and prominulous above, thick and prominent beneath, the main lateral nerves (7–10 on each side of the midrib) impressed above, flat and obscure on the very smooth-looking, almost veinless lower surface, rather widely spreading-ascending and straight until reaching the marginal connecting nerve, obscurely but definitely lepidote-punctate on both surfaces. *Flowers* white; pedicels 5–7 mm long. *Cályx* up to 1.7 cm long, about 1 cm broad, drying black, irregularly lobed, more or less copiously lepidote outside especially on the lobes. *Corolla* with short and stiff hairs on the anterior inner side of the tube. *Capsule* and seeds absent.

TYPE: VENEZUELA: Territorio de Amazonas: in savanna on right bank of Río Pacimoni 60 km. above its mouth, 100–140 m, fl. Nov. 29th 1953, B. *Maguire, J. J. Wurdack & G. S. Bunting 36671* (NY).

This is another very distinct-looking taxon, especially on account of the shape, texture, and nervation of the unifoliolate leaves, but it would be most imprudent, on the evidence of a single collection and in the absence of fruit and seeds, to distinguish it as more than a variety of *T. insignis.*

Tabebuia stenocalyx Sprague & Stapf.

FRENCH GUIANA: Tree 7 m tall, flowers white, infrequent in high forest on laterite, Montague de Kaw, 250–270 m, fl. December 14th 1954, *R. S. Cowan 38837.*

Trinidad, British Guiana. The first record from French Guiana. Not yet recorded from Suriname.

Tabebuia subtilis Sprague & Sandw.

VENEZUELA: Bolívar: tree 15 m high, Río Ikabarú, tributary of Río Caroni, 420 m, fl. Oct. 1946, *F. Cardona 1728*; tree ca. 8 m high, edge of burnt savanna, west side of Uaipán, Uaipán-tepuí, 1400 m, fl. Jan. 1948, *K. D. Phelps & C. B. Hitchcock 355* and (without field-notes) *445;* tree 40 ft. high, corolla yellow, on Río Abácapa, from mouth to ¼ mile upstream, northwestern part of Abácapa-tepuí, Chimantá Massif, 415 m, fl. fr. March 1953, *J. A. Steyermark 74710.*

The first records for Venezuela of a species hitherto known (var. *subtilis*) from riverbanks below the Pakaraima Range in British Guiana and (var. *schultesiana* Sandw. Bot. Mus. Leafl. 17(3):96) from Amazonian Colombia. The collections from the higher altitude, on Uaipân-tepuí, seem to me to be a habitat from or variety with more leathery leaflets which tend to be rounded at the apex with an evanescent cusp or acumen. In the same way, as I have written elsewhere, *T. roraimae* Oliv. and *T dura* (Bur. & K. Schum) Sprague & Sandw. are probably montane habitat forms or varieties of *T. insignis* (Miq.) Sandw.

T. subtilis seems to be closely allied to *T. guayacan* (Seem.) Hemsl., *T. rufescens* Johnst. and *T. obscura* (Bur. & K. Schum.) Sandw., differing from all of these in the longer hairs along the anterior inner side of the corolla tube, and in the conspicuous and longer bracts of the inflorescence.

COMPOSITAE[17]

Adenostemma pakaraimae Maguire & Wurdack, sp. nov.

Herba repens, caule radicante cum petiolis pedunculoque modice breviterque crispulo-puberulo pilis articulatis articulis purpureis; foliis oppositis petiolo 8–16 mm longo lamina i.s. membranacea late ovata apice obtusa basi truncata trinervia vel breviter triplinervia nervis supra planis subtus inconspicue elevatis, margine conspicue obtuseque serrata dentibus 1–2 mm altis, supra modice puberula pilis albidis articulatis simplicibus vel ramificatis, subtus in venis venulisque brevissime puberula superficie glabra. Inflorescentia monocephala pedunculo 4–10 cm longo subtus saepius cum bracteis duobus oppositis puberulis ovatis 7–15 mm longis praedito, supra cum bracteolis 1–2 saepius alternis linearibus puberulis; capitulo nutanti, involucri squamis 2-seriatis lineari-oblongis obtusis vel hebeti-acutis, 4–6 × 1–1.5 mm, extus puberulis conspicue crispulo-ciliolatis intus glabris; floribus ca. 13–15; corollae tubo cylindrico (basi leviter expanso) 5.3 mm longo sparse puberulo lobis 5 triangularibus 1.6–1.8 mm longis; antheris 2 mm longis in tubo circum stylum coalitis, filamentis 2 mm longis apice per 0.5 mm incrassatis circa basim corollae insertis; stylo 5 mm longo ramis linearibus 5.5–6 mm longis; pappi setis 4, clavatis, 1 mm longis; achaeniis immaturis 3–5 mm longis ad costas puberulis inter costas sparsissime glandulosis.

TYPE: repent succulent herb, occasional on forested slopes of Mt. Ayanganna, British Guiana, elev. 1000–1500 m, Feb. 5–6, 1955, *Maguire, Bagshaw & Maguire 40578* (NY).

A. pakaraimae is most closely related to *A. verbesina* (L.) Kuntze; this Antillean and Brazilian species may be differentiated by the glabrous or evanescently puberulous leaves, several-headed inflorescences, glabrous to very obscurely involucral bracts, and more numerously flowered capitula.

Eupatorium memorabile Maguire & Wurdack, sp. nov.

Frutex pauciramosus; caulibus vel ramis teretibus robustis juventate dense villosis indumento demum fusco-brunneo tarde glabratis internodiis 1–5 cm longis; foliis oppositis ovatis crasse coriaceis acutis minute apiculatis vel obtusis margine integro anguste recurvato pennivenis jugis 6–8, venis venulisque supra obscure elevatis subtus prominenter elevatis laxe reticulatisque, supra papilloso-scabridis papillis 1–3 in mm quadr. quoque, subtus in venis venulisque villosulis superficie glabris dense (7–9/mm^2) glanduloso-punctatisque 6–13 × 3–8 cm; petiolo 0.7–2.5 cm longo robusto pubescentia ramorum eadem; corymbo

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[17] Several taxa have been contributed by L. Aristeguieta, Inst. Botánico, Caracas, Venezuela, and *Senecio phelpsiae* by J. Cuatrecasas.

terminali di- vel trichotomo denso; capitulis congestis sessilibus 10-11 × 3.5 mm, 8-9-floris; involucri subcylindrici squamis ca. 25, 3-4-seriatis apicem versus purpureo-tinctis regulariter gradatis, intimis oblongis, obtusis, vel breviter acutis, 6.5-7 × 1.1-1.5 mm, glabris, trinerviis, extimis ovatis, 3.5-4 × 1.5-1.8 mm, apicem versus extus parce glanduloso-puberulis, trinerviis; receptaculo convexo glabro vel paucisetuloso; corollis glabris graciliter tubulosis gradatim ampliatis, tubo 4.9 × 0.6 (basi)-0.9 (apice) mm, lobis 0.4 × 0.3 mm; styli ramis longe exsertis flexuoso-recurvatis, 4.5-5.5 mm longis; achaeniis glabris 2.6 mm longis, 5-angulatis; pappi setis ca. 50, barbellatis apicem versus paulo incrassatis plerumque corollae aequantibus vel parce superantibus 5.4 mm longis, sordido-albidis, basi vix coalitis.

TYPE: shrub 0.7-1.5 m, fls pale lilac, frequent along escarpment overlooking Cano Grande near Cumbre Camp, elev. 1650 m, Cerro de la Neblina, Terr. Amazonas, Venezuela, Jan. 10, 1954, *Maguire, Wurdack, & Bunting 37210* (NY). Paratypes: upper part of escarpment face above Camp 3, Cerro de la Neblina, elev. 1500- 1700 m, Dec. 27, 1953, *Maguire, Wurdack, & Bunting 36959*; scrub forest near Cumbre Camp, Cerro de la Neblina, elev. 1700 m, Jan. 4, 1954, *Maguire, Wurdack & Bunting 37039*; cumbre along west escarpment, Cerro de la Neblina, elev. 1700-1800 m, Jan. 6, 1954, *Maguire, Wurdack, & Bunting 37070*.

In general vegetative aspect, *E. memorabile* is reminiscent of the many coriaceous-leaved Andean species of Sect. Subimbricata, such as *E. jahnii*. The inflorescence aspect is like that of *E. phoenicticum* Rob. (sect. *Hebeclinium*). The convex receptacle would place the Neblina species in sect. *Conoclinium* (disregarding the very few fugacious spicules). Within the genus *Eupatorium*, however, only *E. roupalifolium* Rob. can be ascribed as even a distant floral-character relative of *E. memorabile*, having the same (albeit much smaller) general capitular characters; the pubescence and leaf characters readily separate the two species.

Eupatorium bulbosum Aristeguieta, sp. nov.

Herba perennis erecta 15-30 cm alta, basi bulbosa, ramis juventate pilosis tardius glabratis. Foliis radicalibus suboppositis petiolatis ovatis apice obtusis vel rotundatis basi rotundatis vel subobtusis, 5-9 cm longis, 2.5-5 cm latis, crenato-dentatis membranaceis utrinque sparse pubescentibus penniveniis; petiolo 2.5-4.5 cm longo. Corymbis terminalibus compositis. Capitulis ca. 24-floris, 5 mm altis, 3 mm diametro; pedicellis 2-4 mm longis. Involucri cylindrici squamis 4.5 mm longis, 4-seriatis imbricatis, oblongo-lanceolatis, obtusis, vel subacutis, glabratis. Receptaculo convexo. Corollis 2.8 mm longis, glabris. Achaeniis 1.5 mm longis, scabratis. Pappi setis albis, 2.2 mm longis.

TYPE: root tuberous, flowers white, locally frequent on talus slopes, Cerro Paru, alt. 1500 m, Territorio Amazonas, Venezuela, Feb. 13, 1951 *Richard S. Cowan & John J. Wurdack 31446* (NY).

This new acaulescent species with a tuber-like rootstalk presents a habit very rare in the genus *Eupatorium*. However, its floral characters are those of *Eupatorium* and it seems to be related with *E. penninervatum* Wurdack, recently described from Cerro Sipapo.

Eupatorium morichalanum Aristeguieta, sp. nov.

Suffrutex 1-1.5 m altus, ramosus, caulibus teretibus griseo-pubescentibus. Foliis alternis saepe in axillis proliferis, ovatis vel rhomboideo-ovatis, apice subacutis basi subtruncatis, 4-6.5 cm longis, 2-3 cm latis, serratis, membranaceis, supra pubescentibus subtus punctatis pubescentibus, 3-nervatis; petiolo 5-12 mm longo. Corymbis terminalibus subdensis. Capitulis 20-25 floris, 6 mm altis 5–6 mm diametro; pedicellis pubescentibus brevibus, 1–5 mm longis. Involucri campanulati squamis 2-seriatis subaequalibus lineari-lanceolatis acutis, 4.5–5.2 mm longis, dorso puberulis. Receptaculo leviter convexo. Corollis albis, 3.2–3.8 mm longis, glabris. Achaeniis 2 mm longis puberulis vel glabris cum gladulis sessilibus. Pappi setis corollae subaequantibus.

TYPE: locally frequent at margin of morichal 1–4 km above Salto de Humito, Río Villacoa (Río Auyacoa) 25–30 km from mouth, elev. 130–140 m, Edo. Bolívar, Venezuela, Jan. 7, 1956, *John J. Wurdack & J. V. Monachino 41157* (NY).

This species is closely related to *E. ballotaefolium* H. B. K. In *E. ballotaefolium* the flowers are violet with pubescent non-glandular achenes, whereas the new species has larger leaves and white flowers with glabrescent achenes covered with sessile glands.

Mikania neblinensis Aristeguieta, sp. nov.

Frutex volubilis, caulibus teretibus dense ferrugineo-sericeis. Foliis oppositis petiolatis ovatis apice acutis basi rotundatis, 6–7 cm longis, 3.5–4.5 cm latis, supra scabris subtus dense sericeo-ferrugineis, obscure denticulatis revolutis subcoriaceis penniveniis; petiolo ferrugineo-sericeo, 1–1.5 cm longo. Paniculis terminalibus. Capitulis ca. 1 cm altis; pedicellis 2–4 mm longis. Bracteis oblongo-lanceolatis, 6–6.5 mm longis, apice obtusis vel rotundatis dorso dense pubescentibus; bracteolis oblongo-lanceolatis, 3.5 mm longis, pubescentibus. Corollis 6.5 mm longis, limbo hispidis aliter glabris; tubo proprio 2.5 mm longo; dentibus limbi 1.2 mm longis. Achaeniis 4–4.5 mm longis, sparse puberulis. Pappi setis 6.5–7 mm longis.

TYPE: vine 1–2 m long in low shrubs, infrequent along west escarpment 8 km north of cumbre camp, 1850–1900 m elev., Cerro de la Neblina, Territorio Amazonas, Venezuela, Jan. 10, 1954, *Bassett Maguire, John J. Wurdack, & G. S. Bunting 37191* (NY).

M. neblinensis is related with *M. pannosa* Baker from which it differs by its sericeo-pilose indument covering the young branches and lower leaf surfaces, leaves rounded at the base, and a shorter involucre. *M. pannosa* has long-lanuginose indument and leaves cordate at the base.

Baccharis brachylaenoides DC. var. **ligustrina** (DC.) Maguire & Wurdack, stat. nov.

B. ligustrina DC. Prodr. **5**: 421. 1836.
B. vitis-idaea Oliver. Trans. Linn. Soc. Bot. II, 2: 277. 1887.
B. roraimae Schomb. Fauna & Fl. Guy. 1078. 1848. Nomen nudum.
B. ptariensis Steyermark, Fieldiana Bot. **28**: 624. 1953.

DeCandolle described simultaneously *B. brachylaenoides*, *B. venulosa*, and *B. ligustrina.* Baker (in Mart. Fl. Bras. **6**^{3} I: 82. 1884) synonomized *B. venulosa* under *B. brachylaenoides*, although he apparently did not see the Haenke specimen upon which *B. venulosa* was based; the photograph of the type material (F8178) indicates that Baker was correct, as do subsequent Peruvian collections (*Killip & Smith 25704*, *Spruce 4333*). Subsequent authors of varieties of *B. venulosa* (Hieronymus, Cuatrecases, Steyermark) without explanation did not follow Baker's interpretation; isotypes of *B. venulosa* var. *cuspidibracteata* Steyermark and *B. venulosa* var. *oblanceolata* Hieron. have been examined by us and are certainly conspecific with *B. brachylaenoides;* whether they are sufficiently distinct to be varieties is not germane to the present discussion. Typical var. *brachylaenoides* has large broadly oblanceolate acute to shortly acuminate leaves and a well-developed large panicle. Typical var. *ligustrina* has small, narrowly to broadly oblanceolate obtuse, apiculate, often 1-3-mucronulate leaves,

smaller stature, less well developed panicles, and fewer flowers per head (10-15 rather than 12-25). Many geographically uncoordinated intermediates exist; even the more typical specimens show little geographical correlation. Typical var. *brachylaenoides* is represented by *Riddel 575, Glaziou 11047, 6610, Gardner 490, 778,* all from southeastern Brazil; *Schomburgk 1014, Maguire & Maguire 35084, 35179, 35359, 35447* from Venezuela; and the previously mentioned Peruvian collections. Collections with varying degrees of intermediacy toward var. *ligustrina* are: *Gardner 4915, Miers 3624, Glaziou 11111, 11114,* from southeastern Brazil; *Rusby 1490, Williams 1454, Buchtien 258, Rusby 1579* from Bolivia; and *Phelps & Hitchcock 446, Cardona 1976* from Venezuela. More or less typical var. *ligustrina* is represented by: *Riedel III/73* and *Glaziou 15088* from southeastern Brazil; *Tate 285* from Bolivia; *Steyermark 58725, 59928, 60123, Steyermark & Wurdack 337, 338, 339, 340, 773, Phelps & Hitchcock 398, Maguire & Maguire 40439, Steyermark 74892, 75872, Maguire, Wurdack, & Bunting 37114, 37297, 37313, Pinkus 110, Steyermark 58796, Quelch & McConnell 91, and Tate 399*, all from southern Venezuela and adjoining Brazil. The quantitative characters used to distinguish *B. ptariensis* from *B. vitis-idaea* have no significance; the degree of inflorescence-development varies greatly within the series *Steyermark & Wurdack 337-340,* all collected within a very small area on Chimantá-tepuí. It is believed that the robust plants of var. *brachylaenoides* represent a response to a sheltered environment as contrasted to the usually open areas in which the diminutive plants of var. *ligustrina* grow, at least in the Pacaraima cumbres. This study has been supplemented by a generous loan of the Kew material of the taxa concerned.

Aspilia rubra Aristeguieta, sp. nov.

Suffrutex caulibus simplicibus, erectis, usque ad 1 m altis, sparse adpresse pilosis. Foliis oppositis brevipetiolatis lineari-lanceolatis apice acuminatis basi obtusis vel rotundatis, 8-15 cm longis, 1.2-2.2 cm. latis, utrinque sparse adpresse pilosis, denticulatis firme chartaceo-membranaceis penniveniis; petiolo 2-3 mm longo. Capitulis 1 vel 2, terminalibus in pedunculis 2-8 cm longis; disco 12-15 mm diametro. Involucri campanulati 2-seriati, 10-15 mm alti, phyllariis inaequalibus (exterioribus longioribus) lanceolatis acutis herbaceis strigillosis, interioribus similibus brevioribus, Radiis rubris ca. 10, neutralibus, oblongis, dorso in nervis breviter pilosis, 11-12 mm longis, 3.5-4 mm latis; flosculis disci glabris 4 mm longis. Achaeniis 4 mm longis sparse puberulis vel glabris, maturis rugoso-tuberculatis. Pappi corona 0.5 mm longa.

HOLOTYPE: herb 0.3-1 m, rays 11-12 orange-red, disc flowers orange, occasional at savanna edge between Puerto Ayacucho and Sanariapo, elev. 100-120 m, Territorio Amazonas, Venezuela, Nov. 11, 1953, *Bassett Maguire, John J. Wurdack, & George S. Bunting 36147* (NY). Paratype: Carretera Puerto Ayacucho hacia la Boca del Río Sanariapo, alt. 120 m, Territorio Amazonas, Venezuela, May, 1940, *Llewelyn Williams 13078,* Instituto Botánico, Caracas, Venezuela.

A. rubra is characterized by its red flowers which are very exceptional in the genus.

Verbesina schomburgkii Schultz-Bip. ex Klatt subsp. **ligulata** Maguire & Wurdack, subsp. nov.

Capitula ligulata; ligulis 5-10 ellipticis vel ovato-ellipticis apice 3-lobulatis; lamina 9-12.5 × 4-4.5 mm; tubo 1.5-2 mm longo.

HOLOTYPE: Slender tree 3-6 m tall, ligules and disk fls yellow, locally common in intervales, drainage of main branch, Cano Yutaje, Cerro Yutaje, Terr. Amazonas, Venezuela, elev. 1500 m, Feb. 17–19, 1953, *Maguire & Maguire 35283* (NY). Paratypes: Shrub or small tree 2–3 m tall, ligules 8–10 yellow, infrequent on rocky slopes along middle section, main branch, lefthand fork of Cano Yutaje, Cerro Yutaje, elev. 1300–1400 m, Feb. 15, 1953, *Maguire & Maguire 35239;* slender tree 3- 5 m tall, ligules yellow, frequent in cumbre of Cerro Coro-Coro, Terr. Amazonas, Venezuela, elev. 1500 m, Mar. 2, 1953, *Maguire & Maguire 35429;* virgate shrub to 5 m, rays 5–7 yellow, occasional in opening in cloud forest below Tower Escarpment, Ilu-tepuí, Edo. Bolívar, Venezuela, elev. 1900 m, Mar. 11, 1952, *Maguire 33372;* shrub 4 m tall, rays yellow, frequent on montane slopes between Camp 2 and base of escarpment, Ilu-tepuí, elev. 1900–2100 m, Mar. 16, 1952, *Maguire 33452;* shrub 10–12 ft tall, rays and disc florets yellow, lower mixed *Bonnetia* forest above southeast-facing upper shoulder on slope leading to summit of Apacara-tepuí, Chimantá Massif, Edo. Bolívar, Venezuela, elev. 2000–2150 m, June 20, 1953, *Steyermark 75812.*

Steyermark (Fieldiana Bot. 28: 676. 1953) discussed the probable synonomy of *V. schomburgkii* and *V. guianensis* Baker; we have confirmed this by examination of *Schomburgk 654/993* and *194S*, kindly lent by Kew. The typical eligulate subspecies has also been collected, apart from Steyermark's topotypical *58670*, on Serra do Sol (*Maguire & Maguire 40447*), where the field notes indicate a completely eligulate population. The ligulate and disc achenes seem to show no differences so old-flowering or fruiting material, such as *Steyermark & Wurdack 985* from Chimantá, cannot surely be placed; the geographic anology would place all Chimantá collections in subsp. *ligulata.*

V. pilosa Maguire & Wurdack, a ligulate species to be based on *Phelps & Hitchcock 424* from Uaipán-tepuí and also represented by Cardona *2628* from Auyán-tepuí, is closely related to *V. schomburgkii* but has much denser lower leaf surface pubescence, persistently pubescent upper leaf surfaces, and densely pubescent involucral bracts which are all approximately the same length. *Steyermark 60070,* from Soropán-tepuí, has rayed capitula, with leaves more pubescent than usual for *V. schomburgkii* subsp. *ligulata;* while suggestive of *V. pilosa,* this specimen seems best assigned to *V. schomburgkii* subsp. *ligulata* because of the gradate sparsely puberulent bracts.

In revising *Verbesina* sect. *Lipactinia* (Am. Jour. Bot. 12: 625–640. 1925), Blake noted that some species, such as *V. arborea* and its allies, may occasionally or always have a few small rays; probably the entire genus must be reevaluated in light of the lesser importance of the presence or absency of rays. Head size likewise seems to be a rather tenuous character, with floret counts in collections of *V. schomburgkii* subsp. *ligulata* from Yutaje ranging from 20 to 45. *V. glabrata* H. & A. is very closely related to *V. schomburgkii* and *V. pilosa*; the Brazilian species differs from both in its thinner leaves and longer pedicels. *V. pilosa* also differs from *V. glabrata* in its non-gradate phyllaries, and *V. schomburgkii* has proportionately wider, more or less obovate, short-acuminate leaves.

Calea cardonae Maguire & Wurdack, Mem. N. Y. Bot. Gard. 8: 146 (1953) var. **cardonae.**

TYPE: Acopán-tepuí, Guayana, Venezuela, *F. Cardona 2274* (US).

The typical form of *C. cardonae* as known at this time is confined to the Chimantá massif.

Calea cardonae var. orientalis Maguire & Wurdack, var. nov.

A var. *cardonae* similis, sed laminis foliorum firme chartaceis, anguste vel late ellipticis, 2–4(5) cm longis, 10–18(25) mm latis.

TYPE: shrub 1-1.5 m high, rays yellow, occasional, open slopes at 2400 m alt., Ilu-tepuí, Edo. Bolívar, Venezuela, March 20, 1952, *Bassett Maguire 33523* (NY). Paratypes: shrub 2 m high, scrub savanna at 1100 m alt., Holi-tipu, British Guiana, November 10, 1951, *Maguire & Fanshawe 32529;* Ilu-tepuí at 2300 m alt., *Maguire 33540*; shrub 2 m high, small "bush islands," savannas between Chi-Chi and Chinowieng at 1000 m alt., February 10, 1955, *Maguire, Bagshaw & Maguire 40648* (intermediate to var. *cardonae*).

The variant with paler, firmer, and smaller leaves seems to be confined to the eastern part of Guayana in Venezuela and adjacent British Guiana.

Calea divaricata Benth. Jour. Bot. Hook. 2: 44 (1840) var. **divaricata.**

Calea suffruticosa Maguire & Wurdack, Mem. N. Y. Bot. Gard. **8**: 149. 1953.

TYPE: Richard Schomburgk, "near the Roraima Mountain" [Venezuela], Kew.

Generally distributed on open areas, Gran Sabana, Venezuela, and Ayanganna Savanna, British Guiana.

Calea divaricata var. **diffusa** Maguire & Wurdack, var. nov.

Suffrutex diffusus, 5-6 dm altus; laminis ca. 1 cm longis; pedunculis 1.0-1.5 cm longis; capitulis radiatis, parvis, 6 mm altis, floribus ligulatis 3-4, floribus disci 8-10, corollis ca. 3.5 mm longis; achaeniis ca. 2 mm longis, squamulis oblanceolatis, obtusis, ca. 1.5 mm longis.

TYPE: diffuse shrub 6 dm high, rays 3-4, yellow, rare but forming colonies associated with No. *33298* (*C. divaricata* var. *divaricata*), Kamarang Head, Gran Sabana, Estado Bolívar, Venezuela, at 800-950 m alt., March 6, 1952 (NY).

Strikingly distinct in the field by virtue of its reduced stature, more diffuse habit and smaller floral and vegetative parts, this variant maintains discrete colonies within populations of var. *divaricata.*

C. divaricata is used by Arecuna Indians as a medicinal plant.

Calea linearifolia Maguire & Wurdack, sp. nov. (Fig. 70)

Frutex suffruticosus 3-15 dm altus; ramulis tenuibus acute sulcate angulatis, inter angulos scabrido-hirsutulis; foliis oppositis, laminis lineari-oblongis vel lineari-oblanceolatis, (1.5)2 – 3 cm longis, 1.5 – 3(5) mm latis, glabris, coriaceis, subtus punctatis, firme nervatis, venis prominentibus, valde margini-nervatis, apice obtuso, basi angusta, sine petiolo manifesto; inflorescentiis terminalibus, capitulis 1-2, bracteis subtendentibus fere 2-jugis lineari-lanceolatis, glabris, punctatis, 7-8 mm longis, capitulos excedentibus; pedunculis 2-3 cm longis, glabris, valde sulcate angulatis; phyllariis 3-seriatis, oblongo-lanceolatis, obtusis 3-5 mm longis, glabris, vittatis; paleis ca. 5 mm longis, obtusis; floribus ligulatis probabiliter deficientibus, floribus discoideis 5-10 hypocrateriformibus, ca. 4 mm longis; achaeniis albidis, 4-angulatis, ca. 2 mm longis, glabris, sparse ciliolatis angulis exceptis; pappo ca. 3 mm longis, squamulis 12-15, 2-seriatis, scariosis, lineari-acuminatis.

TYPE: shrub 0.3-1.0 mm high, in old fruit, occasional, cumbre sabanita, head of camp stream at 2000 m alt., Cerro Parú, Terr. Amazonas, Venezuela, February 2, 1951, *Cowan & Wurdack 31178* (NY). Paratype: suffruticose shrub 0.5-1.5 m high, western rim Cerro Parú at 2000 m alt., February 4, 1951, *Cowan & Wurdack 31219.*

A most distinct species, known only from the cumbre of Cerro Parú. This small shrub is probably a derivative of *C. abelioides*, the more widespread Highland species south of the Ventuari River.

Calea lucida Maguire & Wurdack, sp. nov. (Fig. 70.)

Frutex ramosus 4-8 dm altus; ramulis purpurellis, valde sulcate angulatis,

sparse strigose hirsutulis, trichomatibus sursum appressis; foliis oppositis, laminis 3.0–4.5 cm longis, 2.2–3.5 cm latis, orbicularibus, late ellipticis vel late ovatis vel obovatis, lucidis, glabris (juvenilibus persparse puberulis), crenulato-dentatis, integris subter medio, apice acuto, basi acutiuscula vel subcuneata; primo jugis duobus venarum lateralium supra recurvis prominentioribus, venis reticulatis, supra prominulis, subter prominentibus; petiolo 3–5 mm longo; capitulis solitariis terminalibus majusculis hemisphaericis, multifloris, radiatis; pedunculis 3–5 cm longis; bracteis subtendentibus 2-jugis, foliaribus, glabris, ovatis, acutiusculis, 5–8 mm longis; phyllariis 3-seriatis, exterioribus late orbicularibus oblongis, ca. 8 mm latis, 10 mm longis, corpore indurato, marginibus scariosis, interioribus ca. 12 mm longis, angustioribus sed plus late scario-marginatis; floribus ligulatis plus 12; floribus disci pernumerosis, 75–100, paleis subtendentibus conduplicatis naviculiformibus, oblongo-obovatis, apice rotundato vel late obtuso, eroso, ca. 8 mm longo; corollis 5–6 mm longis, lobis ca. 1.5 mm longis; achaeniis 2.25–2.50 mm longis, prismaticis, 5-angulatis, ad basim angustatis glabris; pappo 2-seriato, squamulis ca. 15–18, 5–6 mm longis, lanceolatis, attenuato-aristatis, aliquando 2-3-partitis ad apicem.

TYPE: shrub 4–8 dm high, radiate, but ligulate flowers post-mature and lost, occasional in scrub bush, Mesa Ridge at 2000 m alt., Cerro Ilu-tepuí, Guayana, Venezuela, March 23, 1952, *Maguire 33550* (NY). Known only from the cumbre of Ilu-tepuí.

Calea lucida is to be interpreted as derived from the polymorphic *C. lucidivenia.* The Ilu-tepuí plant has solitary massive heads with 75–100 florets, and suborbicular leaves. Both of these are mere quantitative expressions of characters variable in *C. lucidivenia,* but form and induration, and lack of vittation of the involucral bracts of *C. lucida* are strikingly distinctive from those of *C. lucidivenia,* which are strongly vittate.

Calea orbiculata Maguire & Aristeguieta, sp. nov.

Frutex virgatus vel pauciramosus 1–2 m altus; ramulis conspicue sulcatis, glabris vel sparse glandulosis vel sparse strigoso-puberulis; foliis oppositis, sessilibus vel petiolo brevissimo, 1 mm vel minus longo; laminis orbicularibus vel perlate ellipticis, coriaceis glabris supra lucidis, subtus sparse vel moderate glanduloso-punctatis, valde pinninervatis, 6–8 jugis, valde reticulatis, margine subintegra vel minute denticulato-crenulata; capitulis 1, saepe 2–3, hemisphaericis vel late campanulatis, ca. 20 mm latis; pedunculis 3–4 cm longis, minute puberulis; bracteis subtendentibus 1-2-jugis, foliaceis, 6–10 mm longis, 6–8 mm latis, late ovatis obtusis navicularibus valde 9-11-nervatis, praecipue glabris, scario-marginatis; phyllariis 3-4-seriatis oblongis vel oblongo-ellipticis 12–18 mm longis, membranaceis, valde vittatis, scarioso-marginatis, minute ciliolatis; paleis conduplicatis, lanceolatis, ciliolatis 8–9 mm longis; floribus ligulatis 12–15, ligulis lineari-oblongis, 18–20 mm longis, 3–6 mm latis; floribus discoideis pernumerosis; corollis 8–9 mm longis glabris, tubo 3–4 mm longo, lobis triangularibus ca. 1 mm longis; achaeniis glabris, acute 4-angulatis; pappo squamoso, squamulis 4–5, eroso-scariosis, inaequaliter truncatis vel obtusiusculis, 0.5–1.5 mm longis, uno solo lanceolato, acutissimo serrulato, 2.0–3.0 mm. longo.

TYPE: virgate or little-branched slender shrub 1.0–1.5 m high, ligules yellow, rocky places in scrub savanna at 1350 m alt., Left Fork Caño Yutaje, Cerro Yutaje, Río Manapiare, Amazonas, Venezuela, Feb. 12, 1953 *Bassett & Celia K, Maguire 35197* (NY). Paratypes, Serranía Yutaje, *Maguire & Maguire* (Cerro Yutaje) *35128;* (Cerro Coro-Coro) *35448.*

Calea orbiculata, confined to Serranía Yutaje, is most closely related to *C. phelpsiae* which was collected on the nearby Cerro Yaví. The first has orbicular minutely denticulate sessile leaves which are totally glabrous. *C. phelpsiae* has ovate or elliptic, crenate-serrate leaves which are sparingly but obviously strigulose beneath, and are distinctly petiolate.

Calea punctata Maguire & Wurdack, sp. nov. (Fig. 70.)

Frutex moderate ramosus 1–3 m altus; ramulis 2–3 mm diam., sulcatis, primum tenus subpannoso-tomentosis, demum puberulis; foliis oppositis, laminis coriaceis, (2.5) 3 – 4 cm longis, (1.5) 2 – 4 (4.3) cm latis, orbiculatis a late ovatis, apice rotundato vel late obtuso, basi subcordata, truncata vel late obtusa, crasse crenatis, 3-5-plinervatis, venis prominentibus superficiebus amobobus, glabris, conspicuis puberulo-punctatis; petiolis 3–6 mm longis; capitulis terminalibus, majusculis, hemisphaericis, solitariis (vel aliquando 1–2 minoribus subterminalibus); bracteis subtendentibus 6–8 foliaribus ovatis ellipticis vel suborbicularibus, 6–10(18) mm longis; pedunculis 1–3 cm longis; phyllariis 2-3-seriatis, subaequalibus membranaceis, vittatis, late oblongis, 10–12 mm longis, late scario-marginatis; floribus ligulatis 20–25, ligulis lineari-oblongis, ca. 15 mm longis, luteis lucidis; floribus disci pernumerosis plus 100; paleis subtendentibus ca. 8 mm longis, induratis, valde 5-nervatis, erose 3-dentatis, lobo medio aristato 2 mm longo; corollis hypercrateriformibus, 5.5–6.0 mm longis, glabris; achaeniis prismaticis 4 (5)-angulatis ca. 3 mm longis, ad basim angustatis nigrescentibus glabris; annulo albo evidenti; pappo 1-seriato, squamulis ferme 8–10, 1.0 – 2.5 mm longis, rigidis, anguste lanceolatis peracutis.

TYPE: shrub to 3 m high, little-branched or virgate, ligules 20–25, yellow, frequent on rocky places and in thickets, scrub savanna, near south rim, Left

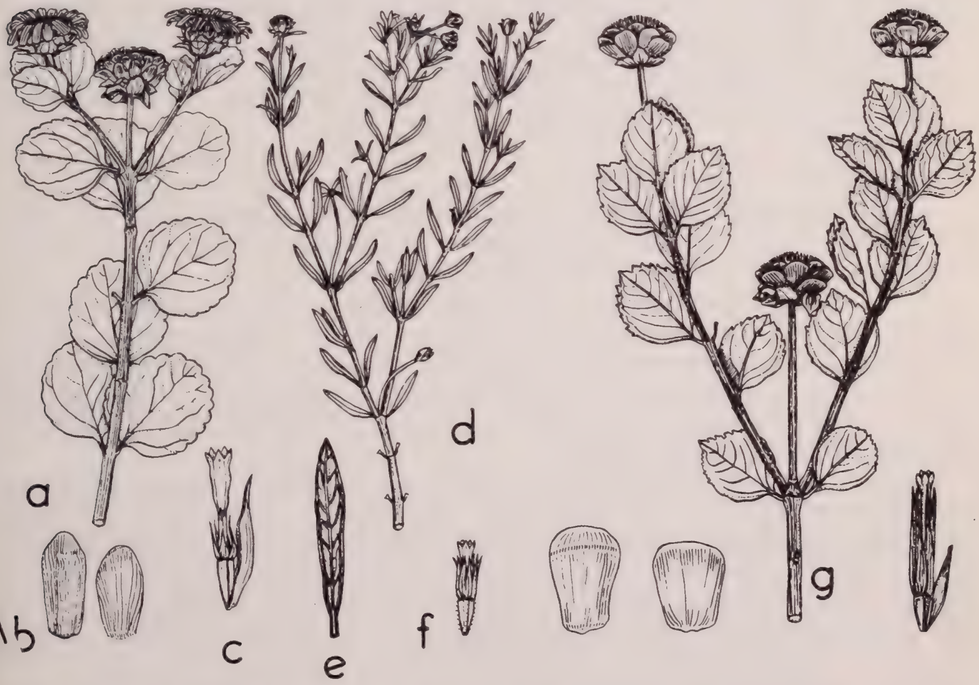

FIG. 70. *a–c, Calea punctata. a,* habit, × ¼; *b,* phyllaries, × ¾; *c,* floret with subtending palea, × 1½. *d–f, Calea linearifolia. d,* habit, × ¼; *e,* leaf, × ½; *f,* floret, × 1½. *g–i, Calea lucida. g,* habit, × ½; *h,* phyllaries, × ¾; *i,* floret with subtending palea, × 1½.

Fork Caño Yutaje, at 1350 m alt., Cerro Yutaje, Amazonas, Venezuela, February 1, 1953, *Bassett Maguire & Celia K. Maguire 35196* (NY). Paratypes: Cerro Yutaje, Venezuela, *Bassett Maguire & Celia K. Maguire 35213, 35067, 35268.*

C. punctata seems to have no immediate relatives, so far known, in the region of the Guayana sediments.

Senecio yapacanus Aristeguieta, sp. nov.

Suffrutex scandens ramis tenuissime arachnoideis. Folia alterna petiolata, chartacea. Petiolus 10–14 mm longus. Lamina elliptico-lanceolata apice acuta vel attenuata acuminata basi rotundata, margine integra vel minutissime denticulata, 8–12 cm longa, 3–5 cm lata, supra glabra, subtus tenuissimo velo lanato-arachnoideo praedita vel glabra. Inflorescentia terminalis paniculata, axi ramulisque leviter arachnoideis. Capitula discoidea, sessilia vel subsessilia glomerata disposita. Involucrum cylindraceum, 5.5–6 mm longum, bracteis 8 lineari-oblongis apice acutis glabris. Calyculus cum 5 bracteolis 2-3 mm longis, apice acuminatis, subglabris. Flores 10, 3 exterioribus femineis, corolla 4 mm longa, tubulosa glabra limbo 4-5-lobato; floribus centralibus hermaphroditis, corolla 5.5 mm longa, tubulosa glabra limbo 5-lobato. Achaenia glabra, 1.5 mm longa. Pappus albidus, 5 mm longus.

TYPE: Vine, flowers white, occasional in cumbre, elev. 1200 m, Cerro Yapacana, Terr. Amazonas, Venezuela, Jan. 3, 1951, *Bassett Maguire, Richard S. Cowan & John J. Wurdack 30719* (NY). Paratype: Woody vine, occasional on west escarpment face, elev. 1800 m Cerro Huachamacari, Terr. Amazonas, Venezuela, Dec. 14, 1950, *Maguire, Cowan & Wurdack 30232.*

This new species is related to *S. oronocensis* DC. from the Bolivian Andes; it differs by its scarcely arachnoid-lanose leaves never completely covered by white tomentum on the lower surfaces and its completely glabrous involucral bracts. The bracts of *S. oronocensis* are covered by a brown lanose tomentum. *S. oronocensis* was described from a Haenke collection, since credited to Venezuela. Dr. Cuatrecasas, however, informed me that the original locality was Bolivia or eastern Peru and that *S. baccaradiflorus* Rusby is a synonym of *S. oronocensis.*

Senecio phelpsiae Cuatr., sp. nov.

Frutex scandens, ramis in sicco badiis subrugosis et parce granulosis peridermato plus minusve separabili extremis leviter striatis, valde juvenilibus lana crispa ferruginea satis decidua tectis mox glabris.

Folia alterna crassa viridia nitida, valde juvenilia tomento crispo ferrugineo deciduissimo munita mox glaberrima. Petiolus 2–8 mm longus crassus. Lamina succulenta oblongo-elliptica vel oblonga basi paulo attenuata apice obtusa vel acutiuscula margine integerrima, 5–10 cm longa, 1–2.8 cm lata, utrinque laevis; in sicco translucida, costa et nervis 5 paribus ascendentibus arcuatis filiformibus immersis transpecte visibilibus.

Inflorescentiae terminales corymboso-paniculatae pedunculatae exfoliatae. Pedunculus robustus folia excedentia cum ramis in statu juvenili tomento lanuginoso ferrugineo munitus mox glaber. Rami ramusculique subteneres striolati elongatique bracteolis lanceolatis vel linearibus muniti. Pedicelli graciles, sed praecipue erecti, striolati mox glabri 1–2 bracteolis brevibus muniti 1.4–5 cm longi, apice incrassati 1-2-bracteolati. Capitula radiata. Calyculus nullus. Involucrum campanulatum primum lanuginosum mox glabrum, 8 bracteis crassiuscule herbaceis oblongo-lanceolatis ca. 9 mm longis 1.8–3 mm latis, margine scariosis. Receptaculum alveolatum marginibus breviter fimbriatum 2 mm latum. Flores marginales feminei ligulatae 3–4, corolla lutea glabra ca. 14 mm longa,

tubulo crassiusculo 6 mm, ligula ovato-oblonga, 3 mm lata, 7-nervata, apice 3-dentata. Flores disci hermaphroditi 11–12, corolla tubulosa glabra lutea, 9 mm longa, tubulo 5 mm longo, dentibus linearibus, 1 mm longis. Antherae 3 mm longae, basi obtusae. Rami stigmatici elongati flexuosi apice subtruncati parce papillosi. Pappus stramineo-albicans.

TYPE: VENEZUELA: Terr. Amazonas: Cerro Guanay, Caño Guaviarito, Río Manapiare, Río Ventuari, infrequent, rocky elevations at 2,000 m alt. Subsucculent vine or scandent subshrub, *Bassett Maguire, Kathleen D. Phelps, Ch. B. Hitchcock & G. Budowski 31737* (NY; isotype, F).

Senecio phelpsiae is a striking species for its thick, smooth, fleshy, narrowly elliptical or oblong leaves. It is closely related to *S. jahnii* Cuatr. but differs from it by the very short-petiolate and narrower leaves which have another kind of nervation, by its smaller heads and flowers, and by the almost complete absence of a calycle. *S. cobrensis* Cuatr., a related species, has broader, acute, long-petiolate leaves and a different form and size of flowers. *S. cucullatus* Klatt has broader, long-petiolate leaves and smaller heads and flowers. *S. haughtii* Cuatr. has richer and denser inflorescences, shorter and more bracteolate pedicels and broader, long-petiolate leaves. The very deciduous woolly indument on the buds and young leaves and branchlets of *S. phelpsii* has not been observed in the other, related species.

Mutisieae.

Forty-nine species of Mutisieae are presently known from Guayana. They form a closely interrelated group of genera which suggest a history of closed phyletic development and phytogeographically restricted distribution. Of them, only one, *Gongylolepis columbiana* Cuatr., is extra-Guayanan (occurring in the eastern Andes of Venezuela and Colombia).

Previously to 1931, four members of this assemblage has been recognized, viz., *Gongylolepis benthamiana* Rob. Schomb., *Stifftia martiana* Baker [*Gongylolepis martiana* (Bak.) Cuatr. & Steyerm.], *Stifftia condensata* Baker [*Stomatochaeta condensata* (Bak.) Mag. & Wurd.], and *Quelchia conferta* N. E. Brown. During the period 1931–39, based on specimens collected by Tate, Blake proposed ten additional names (six in *Stenopadus,* including *S. cinereus* Gleason & Blake, herein transposed to *Chimantaea,* and *S. variabilis,* herein synomized under *Stomatochaeta condensata*), bringing the total to 13. Now, in the past two decades, contemporary exploration in Guayana has brought to light 36 additional species (and 3 subspecific taxa), of which 14 have been published. Nine are described herein, and 13 are to be treated in the succeeding paper.

During the progress of botanical exploration in Guayana, there has accumulated an impressive and significant body of evidence bearing upon fundamental problems of plant phylogeny, relationships, and geography. Members of the Composite *Mutisieae* are of special interest in this regard. The following short consideration briefly summarizes arguments which support our interpretation of phyletic derivation and relationship, and hierarchal arrangement of Guayana mutisias. Dr. Sherwin Carlquist has examined our materials anatomically, and has provided a body of data which complements our own. His studies are presented in papers under the titles "Anatomy of Guayana Mutisieae. I. Pollen," and "Anatomy of Guayana Mutisieae. II. Floral Venation" (Mem. N. Y. Bot. Gard. 9:000–000. 1957). Pollen descriptions used in this paper are furnished by Dr. Carlquist.

Subtride **Gochnatinae.**

Among the gochnatinioid representatives, i.e. those with regular corollas, there are 32 remarkably clear-cut, distinct Guayanan species. They, by virtue of general facies and morphological characterization, fall into several readily recognizable natural generic groupings. Of these, the largest and basic assemblage (*Stenopadus* with fifteen clear-cut species) displays most strongly those characters which are generally accepted as primitive in the Compositae, viz., massive, many-flowered terminal, usually solitary, homogamous, rayless heads subtended by numerous multi-serial, relatively large phyllaries; strongly paleaceous receptacles; carnose, regular corollas with complex morphology and vascular supply; complex achenial and stylar vasculation; simple stigmatic branches; subpaleaceous pappus; ample veiny leaves; and arboreous habit, in which the trunk may reach a diameter of several decimeters, and in which the wood is compact, very hard and heavy, with a specific gravity as much as 1.1 or 1.2.

The remaining gochnatinioid genera (*Chimantaea, Stomatochaeta,* and *Quelchia*) (the extra-Guayanan *Stifftia* excepted), considered to have been derived from *Stenopadus* or stenopadan stock, display in common besides specialized differentiation along their own generic lines, thin-textured corollas with simplified morphology and vascularization. These more simple corollas are considered to be derived or "advanced." Characterization believed to be of phyletic significance is given for the several genera in question.

Stenopadus.

Significant trends or lines of modification have taken place within *Stenopadus* which have led to sectional differentiation. The four sections show complete or partial geographic containment. The section *Kunhardtia,* of four species, is considered basic or the most primitive because of its large, mostly many-flowered, numerously bracted heads, strongly paleaceous receptacles, and corollas with stamens attached within the corolla at the union of the distinct tube and limb. The single species of the section *Campestris* has similar but urceolate corolla with merely flexuous lobes. In the four species of the section *Connellii,* the attachment of anther filaments has moved up to the sinus, the receptacular pales have been reduced to a few in number or are lacking, and the pappus setae are filiform. In the six species of the section *Stenopadus,* the filaments are attached in the sinus, the receptacles remain strongly paleaceous, and leaves are strongly reticulate-veined. This last distinguishing feature makes members of the section *Stenopadus* immediately and easily recognized.

Stifftia

Morphologically most closely associated with *Stenopadus,* but geographically and probably historically most distantly set off from it. Further remarks are to be addressed to these problems.

Stomatochaeta

Consists of a compact closely interrelated group of four species distinctly set off from *Stenopadus* by fruticose habit, thickly coriaceous leaves with reduced nervature, small few flowered heads, with one or few receptacular pales, "advanced" corollas with simple vasculature, stiffly erect lobes much exceeding in length the undifferentiated 10-nerved tube, and very short, blunt style-branches.

Chimantaea. (to be described in a succeeding paper; Mem. N. Y. Bot. Gard. 9:000).

This is perhaps the most remarkable presumptive derivative of *Stenopadus.* As in *Stomatochaeta,* the leaves are thickly coriaceous, the receptacle epaleaceous except for a few marginal members which may represent merely inner reduced phyllaries, and the corolla more "advanced" with short, thin 5-nerved tube and stiff, erect lobes. In *Chimantaea* the corolla lobes are densely barbate, the achenes more often pubescent, and the nectar-gland at the summit of the achene external to the style base is prominent and deeply 5-lobed (in other members of the Guayana gochnatinias cylindric or prismatic). In habit, members of the genus are conspicuously specialized, having become subsucculent, depressed and little branched, or completely unbranched and in aspect more like a bromeliad or espeletia than any of its congeners. Indeed, *Chimantaea* seems in this respect well on the way to the development of the herbaceous habit. The genus, except for *C. cinerea* (on nearby Auyán-tepuí) is restricted to the Chimantá Massif.

Quelchia.

Shrubby with lateral compound inflorescence; has achieved the ultimate in capitulum reduction. All heads are uniflorous. The genus is geographically restricted to the eastern part of the Guayana Highland.

Subtribe Mutisinae.

Guayana members of the Mutisinae with bilabiate (or ligulate) corollas follow much the same pattern or organization and phyletic differentiation as that observed for the Gochnatinae. There is one central large "primitive" more or less polymorphic group, *Gongylolepis*, out of which, similarly, has come a series of small but distinct satellite genera.

Gongylolepis.

The basic genus, composed of eleven species and three subspecific taxa. It, like its gochnatinioid analogue, is arboreous, has large massive many-flowered, many-bracted terminal solitary heads, large flowers with complex venation, ample pinninerved leaves, and is geographically widespread throughout Guayana. It is believed to have given rise to at least three genera, each of which has 3 or fewer species. All are shrubby, have small few-flowered heads, simpler "advanced" small flowers, and are each geographically restricted.

Duidaea.

Has developed three distinct species, and is perhaps closest to *Gongylolepis* in general character. Its leaves are 1-nerved and linear, flowers have a simplified or "advanced" vascularization; and the pollen shows a prominent departure in form and ornamentation.

The two genera, *Neblinaea* and *Achnopogon* are monotypic, and each is geographically restricted to a single sedimentary massif. Both have compound, laterally disposed inflorescences and small heads with five or fewer flowers, the corollas of simple vasculature. Beyond these common features they differ greatly.

Neblinaea

A well-branched shrub with small gongylolepioid leaves, glabrous phyllaries and corollas, and anthers sagittate with adjacent tails connate.

Achnopogon

A suffrutescent shrub with a short thick primary axis bearing short-shoots terminated by dense rosettes of leaves, and provided with one or several virgate branches. Its phyllaries are strongly bearded, corollas puberulent, and anthers simply caudate but not sagittate, a feature peculiar to this among all the Guayana genera.

Monotypic *Glossarion* presents a particular problem, seeming to bridge or transcent the limits of the subtribes Gochnatinae and Mutisinae.[18] In facies the shrub recalls the stenopadoid assemblage. The ligulate corolla has five equal lobes; hence, if reconstructed as a wholly gamopetalous corolla, it would certainly be actinomorphic and not bilabiate. Styles are smooth as in members of the *Mutisinae*, and the leaf base is half-clasping as in *Gongylolepis*.

Key to the Subtribes and Genera of Guayana Mutisieae

1. Corollas actinomorphic or essentially so; anthers caudately sagittate; subtribe Gochnatinae.
2. Corollas carnose, glabrous, the gamopetalous portion much exceeding the tightly coiled lobes.
3. Corolla-tube 15 (10)-nerved, much exceeding the tightly coiled 3 (2)-nerved lobes; tails of adjacent anthers connate (but easily separable); styles asperulous towards the tip, the branches 1.0–1.5 mm long, undifferentiated; heads massive, terminal, solitary, many-flowered (usually 40–100–flowered); achenes glabrous; corona cylindric, 0.5–1.0 mm high; trees. 1. *Stenopadus.*
3. Corolla-tube 5-nerved, lobes 2-nerved, styles completely smooth, the branches compressed, dilated with marginal stigmatic lines and acute appendages ca. 0.3 mm long; shrubs with slender glabrous branchlets, and narrowly elliptic acute or acuminate, thin-textured leaves; shrubs; confined to southern Brazil, and one species in the lower Rio Negro basin. *(Stifftia.)*
2. Corollas firm or submembranous, but not carnose; the gamopetalous portion equaling or considerably shorter than the erect or merely recurved 2-nerved lobes.
4. Heads solitary and terminal; corollas hirsute within the collar.
5. Heads relatively large, 20–50-flowered; corolla-tubes 5-nerved, the lobes densely barbate-pilose at the tips (this pubescence largely deciduous at anthesis), erect or sometimes somewhat recurved; anther-tails all free; styles asperulous upwards, the branches undifferentiated, 0.7–1.0 mm long; achenes pubescent or glabrous, 6–9 mm long; corona 1.0–1.5 mm long, deeply 5-lobed; virgate or little-branched depressed, subsucculent shrubs. 2. *Chimantaea.*
5. Heads relatively small, 10–20 (30)-flowered; corolla-tube 10-nerved, the lobes glabrous, stiffly erect, 2-nerved; tails of adjacent anthers connate (but easily separable); styles asperulous upwards, the branches obtuse, ca. 0.5 mm long; achenes 6 mm or less long, glabrous, corona entire, 0.5 mm or less long; brittle, much-branched shrubs, the pubescence malpighioid. 3. *Stomatochaeta.*
4. Heads uniflorous, in axillary cymes; corollas glabrous within; tube 5-nerved, the lobes recurved, 2-nerved; style smooth, glabrous, the branches 1.2–1.75 mm long, 3-lobed; achenes glabrous, 4–6 mm long; corona cylindric, 0.3–0.5 mm long; upright, branched shrubs. 4. *Quelchia.*
1. Corollas ligulate, the ligule 5-oblong-dentate, 7-10-nerved; heads 12-16-flowered; anthers caudately sagittate; shrubs; subtribe Mutisinae. 5. *Glossarion.*
1. Corollas bilabiate; subtribe Mutisinae.
6. Heads 8–∞ flowered, massive, terminal, solitary or pedunculate, the peduncles sometimes branched.
7. Leaves pinninerved; anthers caudately sagittate, the adjacent tails connate; achenes glabrous or essentially so; phyllaries broadly obtuse, more or less coriaceous. 6. *Gongylolepis.*
7. Leaves 1-nerved; anthers caudately sagittate, the tails free; achenes obviously pubescent; phyllaries acute or acuminate, more or less pergameneous or papyraceous. 7. *Duidaea.*
6. Heads small, 2-5-flowered, the inflorescences axillary, in 3-7-headed cymes.

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[18] We have attempted to accomodate our material to the organization of subtribes as presented by Hoffmann. It would seem, however, that fresh evaluation of the entire *Mutisieae* is now needed.

8. Phyllaries glabrous, the margins ciliolate; corolla funnel-formed, glabrous; caudal appendage of anther sagittate, the tails of adjacent anthers connate; style-branch tips ca. 1 mm long, rounded, undifferentiated; achene 6–7 mm long, 5-nerved; pappus 3-seriate; leaves oblanceolate. 8. *Neblinaea.*
8. Phyllaries strongly externally bearded; corolla goblet-shaped, puberulent; caudal appendage of anther linear, simple, not sagittate, not connate; style-branch tips obtuse, dorsally unilobate; achene 5–6 mm long, 10-nerved; pappus 5-seriate; leaves elliptic. 9. *Achnopogon.*

1. **Stenopadus** Blake, Bull. Torrey Club 58: 489. 1931, descr. emend.

In 1953* we recognized six species in *Stenopadus* proper (*Eustenopadus* Blake), all endemic to the Guayana Highland. Now, as a result of further exploration, eight additional species have been collected (two of them to be described in the succeeding paper) in Venezuelan Guayana, and one, *S. colombianus* Cuatr. & Steyerm., has been described from Colombian Guayana.

Heads massive, terminal, solitary (in three species sometimes 2–4), homogamous, multiflowered [(15) 40–100]; receptacle glabrous, alveolate, strongly or sometimes not at all paleaceous; corolla actinomorphic, carnose, essentially infundibuliform and differentiated into a cylindric tube, an expanded limb, and tightly coiled, linear-lanceolate lobes, the tubular portion much exceeding the lobes, characteristically 3 (sometimes only 2) distinct veins extending from the base of the corollas into the lobes; anthers caudate-sagittate, the adjacent tails connate; filaments attached either in the sinus of the lobes, at the union of the tube and the limb, or below this union; pollen grains yellowish, tricolpate, the furrows long-pointed; grains prolate to subprolate (prolate-spheroidal in *S. campestris*), spinulose or psilate; polar axis 55–65 μ; achenes prismatic, basically 10-nerved, glabrous; annulus mostly lacking; corona cylindric; pappus-setae mostly subpaleaceous, flattened and connate into a ring at the base. Trees.

TYPE species: *Stenopadus talaumifolius* Blake.

Key to the Sections and Species of Stenopadus

1. Leaves coriaceous, the lateral veins prominulous but the blades not reticulate-veined.
  2. Filaments attached within the corolla at the union of tube and limb, hence at or below the middle of the gamopetalous portion and not at the sinus; receptacle strongly paleaceous; achene obviously 10-nerved; annulus lacking; setae subpaleaceous, 5-8-seriate, subconnate at the base.
    3. Corolla infundibuliform, (18) 20–40 mm long, the lobes tightly coiled; filaments attached at the middle; sect. *Kunhardtia.*
      4. Involucre broadly campanulate, 60-100-flowered; leaf-blades broadly obovate or obovate-oblanceolate, usually 8–25 cm long, 4–8 cm broad.
        5. Involucre substipitate; heads 60–70-flowered; corollas ca. 40 mm long; anthers ca. 15 mm long; leaves usually 10–25 cm long, 6–8 cm broad. 1. *Stenopadus kunhardtii.*
        5. Involucre sessile; heads 80-100-flowered; corollas ca. 30 mm long; anthers ca. 10 mm long; leaves usually 8–12 cm long, 3.5–6.0 cm broad. 2. *Stenopadus huachamacari.*
      4. Involucre obconic or hypocrateriform, 25-30-flowered; leaves obovate or oblanceolate, usually 6–12 cm long, 2–5 cm broad.
        6. Phyllaries obtuse; involucre hypocrateriform, strongly stipitate; heads 40-50-flowered; corollas 18–20 mm long; leaf-blades narrowly oblanceolate, 7–12 cm long, 3–5 cm broad; petioles 15–22 mm long. 3. *Stenopadus stipitatus.*

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*Maguire, B., Cowan, R. S. & Wurdack. J. J. The botany of the Guayana Highland. Mem. N. Y. Bot. Gard. 8: 153. 1953.

6. Phyllaries sharply acute, involucre obconic, 25-35-flowered; corollas 26–30 mm long; leaf-blades oblanceolate to obovate, 7-11 cm long, 3.5-5.0 cm broad; petioles 6–12 mm long. 4. *Stenopadus obconicus.*

3. Corolla campanulate, 16–18 mm long, the lobes flexuous, not coiled; filaments attached below the middle; involucre broadly campanulate, 25-35-flowered; leaves broadly oblanceolate or subcuneate; sect. *Campestris.* 5. *Stenopadus campestris.*

2. Filaments attached to the sinus; corolla-tube infundibuliform-ventricose; achenes with 5 principal nerves; annulus evident; setae 3-4-seriate, capillary, flattened at the base but not connate; sect. *Connellia.*

7. Leaves wholly glabrous or glabrescent; achenes 9–10 mm long.

8. Involucres 5–6 cm long; phyllaries ca. 15-ranked, the middle carinate, shining and strongly keeled, only the lowermost pubescent; corolla-tube 12–20 mm long, glabrous at the sinus within. 6. *Stenopadus connellii.*

8. Involucres 3.5–4.0 cm long; phyllaries 6-8-ranked, not strongly carinate, all externally strigillose; corolla-tube ca. 25 mm long. 7. *Stenopadus chimantensis.*

7. Leaves permanently sericeous beneath; achenes (3) 4–6 mm long.

9. Leaves 6-12 cm long, 4–8 cm broad, oblong-obovate, retuse and rounded at the apex; corolla-tube 8–9 mm long, very scantily pilose within at the sinus; achenes 3–4 mm long. 8. *Stenopadus sericeus.*

9. Leaves rhomboid-oblanceolate, 10-15 cm long, 5–6 cm broad, obtusish or acutish at the apex, narrowly acute to acuminate at the base; corolla tube 12–13 mm long, obviously pilose within at the sinus; achene ca. 5 mm long. 9. *Stenopadus ventricosus.*

1. Leaves (4) 6–18 (30) cm long, chartaceous or coriaceous, the lateral veins prominent, and the blade strongly reticulately-veined; phyllaries externally strongly pubescent; sect. *Stenopadus* (*Talaumifolius*).

10. Branchlets strongly sericeous.

11. Phyllaries acute, not cucullate.

12. Heads 1–3, sessile or on very short peduncles, ca. 15-flowered; outer phyllaries ca. 2.5 mm wide, the inner ca. 1.5 mm wide; leaves obovate, 4–10 cm long; achene ca. 9 mm long, 4 (5)-angled, 12-nerved; corona ca. 1 mm high, prismatic, glabrous. 10. *Stenopadus talaumifolius.*

12. Heads apparently solitary, ca. 30-flowered; outer phyllaries 3.5–9.0 mm wide, the inner 2–3 mm wide; achene ca. 12 mm long, prismatic, 10 (12?)-nerved; corona ca. 0.7 mm high, prismatic, the sides strigose. 11. *Stenopadus eurylepis.*

11. Phyllaries obtuse, strongly cucullate; leaves 12–24 cm long, 6–11 cm broad. 12. *Stenopadus cucullatus.*

10. Branchlets glabrous or essentially so, or at least glabrate.

13. Leaf-blades 10–17 cm long.

14. Leaf-blades oblanceolate, attenuate at the base, dull on the upper surface; peduncles sparsely strigose (5) 10–30 cm long, heads 2–4, 20–30-flowered. 13. *Stenopadus cardonae.*

14. Leaf-blades elliptic-ovate to obovate, the apex acute or obtusish, merely acute at the base, lucidous on the upper surface; peduncle 3–5 cm long; heads solitary, 19–21-flowered. 14. *Stenopadus affinis.*

13. Leaf-blades 20–30 cm long, chartaceous; branchlets densely rufous; heads solitary sessile; phyllaries glabrous or essentially so, indurate, ciliolate, the lower member broadly ovate, obtuse; achene 3-5-angled, with 5 principal nerves; corona prismatic, ca. 0.8 mm long, sparsely hispid-subpilose at the periphery. 15. *Stenopadus colombianus.*

Section 1, **Kunhardtia** Maguire & Wurdack, sect. nov.

Capitula solitaria terminalia majuscula multiflora [(25) 50-100]; corollis in tubo, limbo, lobisque differentiatis; filamentis connectis tubo et limbo affixis; receptaculo valde paleaceo; achaeniis prismaticis; annulo deficienti; corona aliquantum 5-lobata; pappo 5-8-seriato, setis anguste subpaleaceis, ad basim connatis; foliis non reticulatis.

TYPUS: *Stenopadus kunhardtii* Maguire.

1. **Stenopadus kunhardtii** Maguire, Mem. N. Y. Bot. Gard. 8: 151. 1953.

TYPE: spreading tree 12 m high, 1500 m alt., Cerro Sipapo, Amazonas, Venezuela, *Maguire & Politi 28303* (NY; the collection number was mis-cited in the original publication as *28304*).

Distribution. Known only from Cerro Sipapo.

2. **Stenopadus huachamacari** Maguire, Mem. N. Y. Bot. Gard. 8: 151. 1953.

Type: Slender tree 10 m high, 1500 m alt., Cerro Huachamacari, Amazonas, Venezuela, *Maguire, Cowan & Wurdack 30026* (NY).

Distribution. Known only from Cerro Huachamacari.

3. **Stenopadus stipitatus** Maguire & Wurdack, sp. nov.

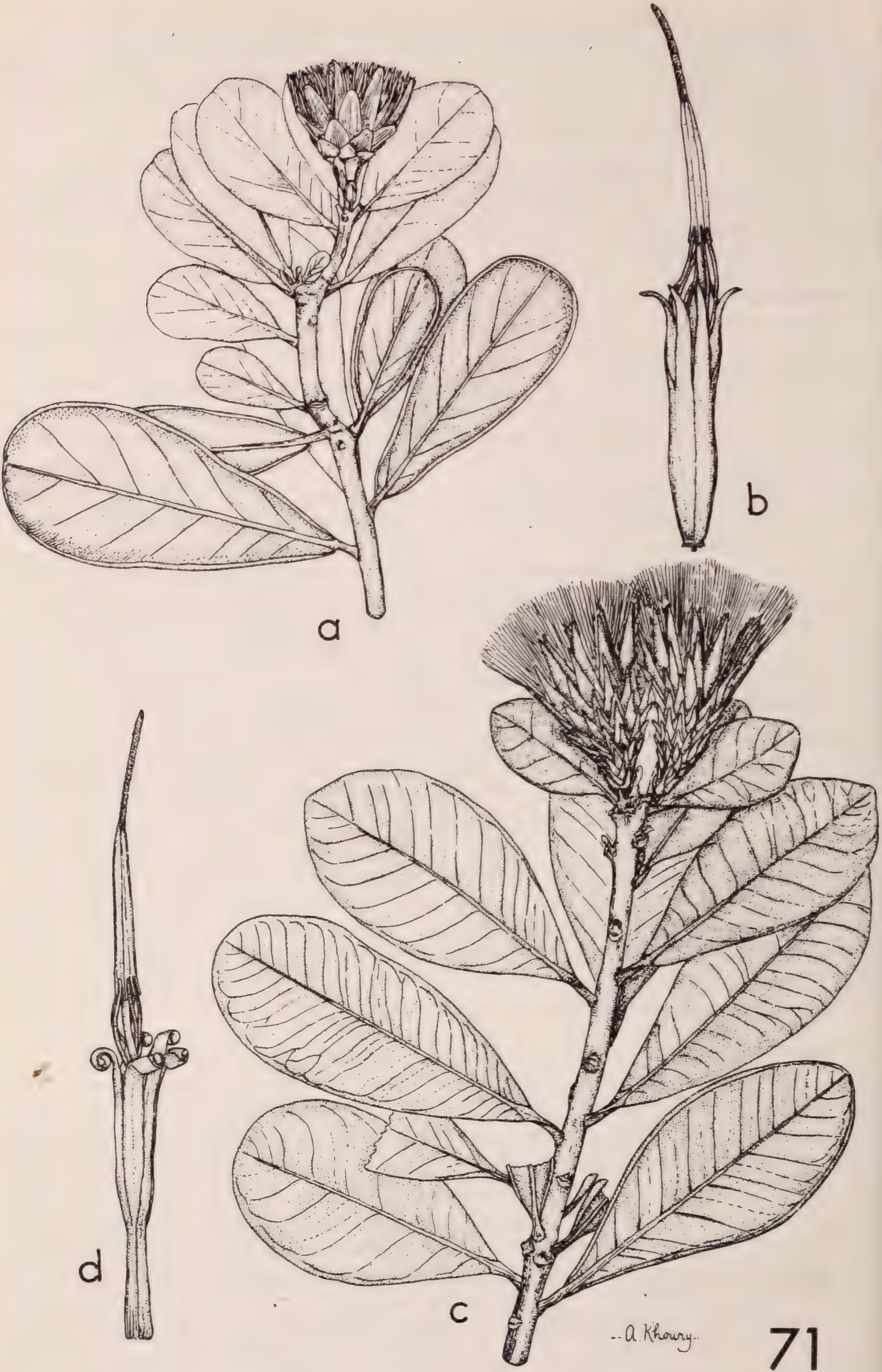
Arbor 4–6 m alta; ramulis teretibus in axillis foliorum dense pilosis, aliter glabris; foliis alternis, laminis elliptico-oblanceolatis, 7–12 cm longis, 3–5 cm latis, ad apicem rotundatis, basi acutis, venis primariis lateralibus prominulis, ca. 15-jugis in nervo marginali collectivo; petiolo lato, 3–5 mm longo; capitulo solitario sessili terminali majusculo, 40-50-floro homogamo; involucro hypocrateriformi 6–7 cm alto, multiseriato; stipite 3.5–4.5 cm longo, 10-12-seriato, bracteis glabris deltoideo-ovatis vel ovatis 3–8 mm longis, carinatis, obtusis; phyllariis ca. 8-seriatis, vix carinatis, gradatis, inferioribus ovato-oblongis 1.5–2.5 cm longis, 7–8 mm latis, superioribus oblongo-lanceolatis ca. 3 cm longis, ca. 6 mm latis, obtusis, intimis anguste 2–3 mm latis; receptaculo plano alveolato sparse piloso multipaleaceo, paleis 2–3 mm latis; corollis glabris actinomorphis subcarneis subventricoso-hypocrateriformibus, tubo cylindrico 10–12 mm longo, limbo ca. 8 mm longo, lobis 7–8 mm longis, circinnatis acutis, 3-nervatis, nervis liberis ad basim corollae; filamentis ca. 17 mm longis, ad basim limbi affixis; antheris 12–13 mm longis, appendicibus apicalibus acutis, appendicibus caudalibus antherarum adjacentium connatis; stylis ca. 40 mm longis, sursum asperulis, ramulis ca. 0.5 mm longis compressis, aliquantum dilatatis, obovatis, acutiusculis; achaeniis glabris, prismaticis, 4-angulatis, ca. 6 mm longis, annulo deficienti; corona ca. 0.5 mm longa, aliquantum 5-lobata; pappo ca. 22 mm longo, stramineo, (4) 5-seriato; setis anguste subpaleaceis, ad apices acute dilatatis, barbellatis, ad bases compressis minute connatis.

TYPE: small branched tree 4–6 m high, heads long-stipitate; infrequent, woodland along margins of Caño Yutaje, Right Fork, at 1500 m alt., Cerro Yutaje, Manapiare River, Terr. Amazonas, Venezuela, Feb. 21, 1953, *B. Maguire & C. K. Maguire 35358* (NY).

Known only by the type collection.

4. **Stenopadus obconicus** Maguire & Wurdack, sp. nov. (Fig. 71.)

Arbor parva 1–5 m alta; ramulis teretibus, in axillis foliorum dense pilosis aliter glabris; foliis alternis, laminis 7–11 cm longis, 3.5–5.0 (6.0) cm latis, glabris, oblongo-oblanceolatis vel obovatis, ad apicem rotundis, ad basim acutis, costa subtus prominenti, aliquantum impressa supra; venis lateralibus primariis 8-10-jugis, in nervo marginali collectivo, prominulis subtus; petiolo 6–12 mm longo; capitulo solitario vel frequenter 2-3, sessili vel pedunculo 1-2 longo, majusculo, 25-35-floro, homogamo; involucro obconico 4.5–6.0 cm longo, 10-12-seriato, phyllariis numerosis glabris, anguste acute lanceolatis, gradatis minute scariociliatis, inferioribus 7–8 mm longis, superioribus ca. 4 cm longis, intimis non angustioribus; receptaculo plano alveolato moderate paleaceo, paleis 10–15, linearibus integris 0.6–0.8 mm latis acutis, ad apicem minute serrulatis, corollis actinomorphicis glabris, parte tubulata 14–15 mm longa, non fere in tubo et limbo differentiatis, sursum expanso, lobis 12–14 mm circinnatis acutis 3-nerva-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tis, nervis liberis ad basim corollae; filamentis ad basim limbi affixis; antheris 14–15 mm longis, appendicibus apicalibus acutis, appendicibus caudalibus linearibus antherarum adjacentium connatis; stylis ca. 42 mm longis, sursum asperulis, ramulis ca. 1 mm longis, patentibus, compressis aliquantum dilatatis, acutiusculis; achaeniis plus minusve prismaticis, rubritinctis, 6–7 mm longis, 10-nervatis, glabris; annulo deficienti, corona aliquantum 5-lobata, ca. 0.8 mm alta; pappo sordido, ca. 2 cm longo, (4) 5-seriato, setis anguste subpaleaceis ad apices acute dilatatis, barbellatis, ad bases compressis minute connatis.

TYPE: small tree 2–5 m high, often virgate, leaves coriaceous, involucre green, obconic, bracts brown-tipped, frequent in low *Bonnetia* bush, vic. Cumbre Camp at 1700 m alt., Cerro de la Neblina, Terr. Amazonas, Venezuela, January 4, 1954, *Maguire, Wurdack & Bunting 37041* (NY). Paratypes, all from Cerro Neblina: shrub or tree 1.5–4.0 m high, border of open savanna at 1800 m, *Maguire, Wurdack & Bunting 37150;* small tree or shrub 1–2 m high, flowers yellow-brown, frequent, along West Escarpment at 1850 m alt., *Maguire, Wurdack & Bunting 37005;* shrub or small tree, heads obconic, frequent, cumbre savanna, at 1800 m alt., *Maguire, Wurdack & Bunting 37077.*

Section 2. **Campestris** Maguire & Wurdack, sect. nov.

Capitula solitaria terminalia; corollis urceolatis in tubo et limbo nondifferentiatis, lobis flexuosis, 3-venatis; filamentis submedio affixis; receptaculo paleaceo; achaeniis subprismaticis; corona aliquantum 5-lobata; pappo 4-5-seriato, setis anguste subpaleaceis, ad basim connatis; foliis non reticulatis.

TYPUS: *Stenopadus campestris* Maguire & Wurdack.

5. **Stenopadus campestris** Maguire & Wurdack, sp. nov. (Fig. 71.)

Arbor parva vel 5 m alta; ramulis glabris, axillis foliorum exceptis; foliis alternis subconfertis; laminis glabris, coriaceis, oblanceolatis vel obovatis subcuneatis, (5) 8–13 cm longis, 2.5–6.0 cm latis, marginibus revolutis, costa subtus prominenti, venis lateralibus 5-6-jugis, improminulis; petiolo 4–8 mm longo; capitulo solitario terminali, paucipedunculato, 20–30-floro, homogamo; involucro hemisphaerico, 2.2–2.8 cm alto 5-6-seriato; phyllariis glabris obtusis, subcarinosis conspicue scario-marginatis, inferioribus late ovatis vel oblongis, 5–15 mm longis, superioribus oblongis vel oblongo-lanceolatis, 4–6 mm latis, 15–25 mm longis, intimis angustioribus ca. 1.5 mm latis; corollis glabris, tubo urceolato ca. 10 mm longo, lobis linearibus 7–9 mm longis, obtusis, flexuosis, non circinnatis valde 3-venosis, venis liberis ad basim tubi; filamentis ca. 25 mm longis, subter tubi medio affixis; antheris 10–11 mm longis; appendicibus apicalibus 2.5–3.0 mm longis, acutiusculis, appendicibus caudalibus sagittatis, ca. 1.5 mm longis, linearibus truncato-acutis, adjacentibus omnino connatis; stylis subulatis, 32–35 mm longis, sursum valde asperulis, ramulis 1.5–1.8 mm longis, non differentiatis obtusiusculis; achaeniis immaturis glabris prismaticis valde 10-costatis, ca. 6–8 mm longis; annulo deficienti; corona 0.5–0.6 mm longis, 5-lobatis sparse hirsuto-pilosis; pappo fulvo, setis 4-5-seriatis, subpaleaceis, 10–18 mm longis, ad basim 0.2–0.5 mm latis, breviter connatis, minute barbellatis.

TYPE: shrubby tree 1.5–5.0 m high, flowers straw-colored, frequent, thickets about edge, Sabana Venado, Caño Pimichín, 2 km above Puerto Pimichín, at 140 m alt., Río Guainía, Territorio Amazonas, Venezuela, April 14, 1953, *Maguire &*

Explanation of figure 71

FIG. 71. *a–b, Stenopadus campestris. a,* habit, × ½; *b,* corolla, × 2. *c–d, Stenopadus obconicus. c,* habit, × ½; *d,* corolla, × 2.

Wurdack 35578 (NY). Paratypes: data as above, *Maguire & Wurdack 35573;* same locality, November 23, 1953, *Maguire, Wurdack & Bunting 36343.*

Distribution. Known only from the type locality, Sabana Venado, where it is a frequent shrub about thicket and woodland margins.

Section 3. **Connellia** Maguire & Wurdack, sect. nov.

Capitula solitaria, terminalia, majuscula 20-40-flora; receptaculo epaleaceo vel paucipaleaceo; filamentis in sinibus affixis; achaeniis prismaticis; annulo deficienti; pappo 3-5-seriato, setis filiformibus; foliis non reticulatis.

TYPUS: *Stenopadus connellii* (Baker) Blake.

6. **Stenopadus connellii** (Baker) Blake, Bull. Torrey Club 58: 490. 1931.

Stifftia connellii Baker. Trans. Linn. Soc. II. 6: 40. *pl.* 8. 1901.

TYPE: summit of Mount Roraima, 8600 feet, *McConnell & Quelch* 661 Kew.

Distribution. Presently known only from Mt. Roraima and Chimantá-tepuí, occurring in cumbre woodlands at 2000–2300 m alt.

Only a single collection from Mt. Roraima (*Tate 439*, NY) has been available for this study. The corolla-tubes of the specimen reach a length of nearly 20 mm, whereas the corollas of the much more amply represented Chimantá population develop tubes only 12–14 mm long. This may represent a racial difference.

7. **Stenopadus chimantensis** Maguire, Steyermark & Wurdack.

Described in "Botany of the Chimantá Massif."[19]

8. **Stenopadus sericeus** Maguire & Aristeguieta, sp. nov.

Arbor parva, 3–8 m alta; ramulis compacte strigoso-sericeis; foliis alternis, laminis firme chartaceis vel subcoriaceis, 6–12 cm longis, (3) 4–8 cm latis, oblongo-obovatis, rotundatis, ad apicem retusis apiculatisque, basi obtusis vel acutiusculis; costa prominenti, venis lateralibus primariis ca. 8-jugis, prominulis supra, subtus improminulis, aequaliter compacteque strigoso-sericeis cum pilis malpighioideis; petiolo 14–18 mm longo; capitulo solitario terminali sessili, a paucis parvis foliis caducis subtentis, 20-25-floro homogamo; involucro 4.0–4.5 cm longo, anguste campanulato; phyllariis gradatis (7) 9-10-seriatis, glabris, subcarnosis sed non carinatis, lucidis, marginibus anguste erosi-scariosis, inferioribus late ovatis, obtusiusculis 5–20 mm longis, superioribus late lanceolatis 25–35 mm longis, apicibus acutiusculis aliquantum cucullatis, intimis angustioribus; receptaculo plano, glabro, alveolato, epaleaceo; corollis subcarnosis, limbo subventricoso, 8–9 mm longo, vena intermedia tenui; lobis circinnatis vel aliquantum flexuosis, linearibus, 16–17 mm longis, persparse in sinibus pilosis, apicibus aliquantum dorsiventraliter compressis; filamentis longiexsertis, in sinibus affixis, laxe adnatis tubo corollae; antheris 11–12 mm longis; appendicibus apicalibus ca. 0.3 mm longis, appendicibus caudalibus sagittatis ca. 2.5–3.0 mm longis acutis, adjacentibus omnino connatis; stylis subulatis ca. 4.0 cm longis, asperulis sursum, ramulis ca. 1 mm longis, compressis obtusis marginibus subscariosis; achaeniis 3–4 mm longis, prismaticis 5-angulatis; annulo perspicuo; corona cylindrica ca. 1 mm longa; pappo sordido, ca. 15 mm longo, 3-seriato, setis aliquantum ad bases compressis, inconspicue barbellatis.

TYPE: tree 3–6 m high, leaves densely sericeous beneath, occasional, dense scrub bush below west escarpment, at 2200 m alt., Ilu-tepuí, Gran Sabana, Edo. Bolívar, Venezuela, March 20, 1952, *Maguire 33490* (NY). Paratype: tree

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[19] Mem. N. Y. Bot. Gard. 9:393–439. 1957.

4–8 m high, leaves sericeous beneath, occasional, upper slopes below saddle between North Peak and central plateau, 2300 m alt., Ilu-tepuí, March 15, 1952, *Maguire 33415*.

9. **Stenopadus ventricosus** Maguire & Aristeguieta, sp. nov.

Arbor mediocris; ramulis dense strigoso-tomentosis, cum pilis fuscis malpighioideis; foliis alternis, laminis firme chartaceis rhomboideo-oblanceolatis, (6) 10–15 cm longis, 5–6 cm latis, dense et compacte strigoso-tomentosis subtus, costa prominenti, venis lateralibus primariis 5-6-jugis, subtus prominulis, supra improminulis, apice obtusiusculo vel acutiusculo, basi anguste acute vel acuminata; petiolo 15–25 mm longo; capitulo solitario, sessili, terminali, paucis bracteoideis foliis subtento, 25-30-floro, homogamo; involucro angusta campanulato, 4.5–5.0 cm longo, in alabastro rhomboideo; phyllariis ca. 35, 6-7-seriatis, glabris, anguste scarioso-marginatis, lucidis carnosis sed non carinatis, inferioribus late deltoideis vel oblongo-ovatis obtusis, 5–20 mm longis, superioribus oblongo-lanceolatis 30–45 mm longis obtusis, intimis angustis subcucullatis; receptaculo glabro alveolato epaleaceo; corollis subcarnosis, tubo ventricoso-urceolato 12–13 mm longo, 6–7 mm diam. (8 mm compresso), lobis valde circinnatis, ca. 18 mm longis, 1.5 mm latis, 3-venosis, apice acutiusculo aliquantum dorsiventraliter compresso; filamentis filiformibus, longiexsertis, in sinibus affixis, ad sinum dilatatis, tubi basi adnatis; antheris 14–15 mm longis, appendicibus apicalibus ca. 3.5 mm longis, acutissimis, appendicibus caudalibus sagittatis ca. 4 mm longis, linearibus, apicibus eroso-acuminatis, adjacentibus omnino connatis; stylis subulatis, ca. 4.5 cm longis, sursum asperulis, ramulis 1.2–1.5 mm longis, aliquantum compressis, obtusis; achaeniis ca. 5 mm longis, nigro-purpureis, glabris, 5-angulatis, 10-nervatis; annulo deficienti; corona ca. 1 mm longa, truncata; pappo sordido, ca. 20 mm longo, 3-4-seriato, setis filiformibus, inconspicue barbellatis.

TYPE: tree 10–12 m high, flowers cream-white, occasional, margin of woodland, east slope at 2200 m alt., Serra do Sol (Uei-tepuí), Brazilian, Venezuelan frontier, Terr. Río Branco, Brazil, Edo. Bolívar, Venezuela, December 28, 1954, *Maguire & Maguire 40401* (NY).

Distribution. Known only from the type locality, occurring as small to medium trees about montane forest margins, on the summit of Serra do Sol. Most closely related to *S. sericeus* from Ilu-tepuí some 100 km to the northward.

Section 4. **Stenopadus.**

Heads solitary or sometimes 2–3, 15-40-flowered; corolla infundibuliform, the filaments attached in the sinuses; receptacle strongly paleaceous; achenes prismatic; corona prismatic, slightly 5-sulcate, often pubescent; pappus 5-8-seriate, the setae narrowly subpaleaceous, flattened and united at the base; leaf-blade strongly reticulate-veined.

TYPE: *Stenopadus talaumifolius* Blake.

10. **Stenopadus talaumifolius** Blake, Bull. Torrey Club 58: 491. 1931.

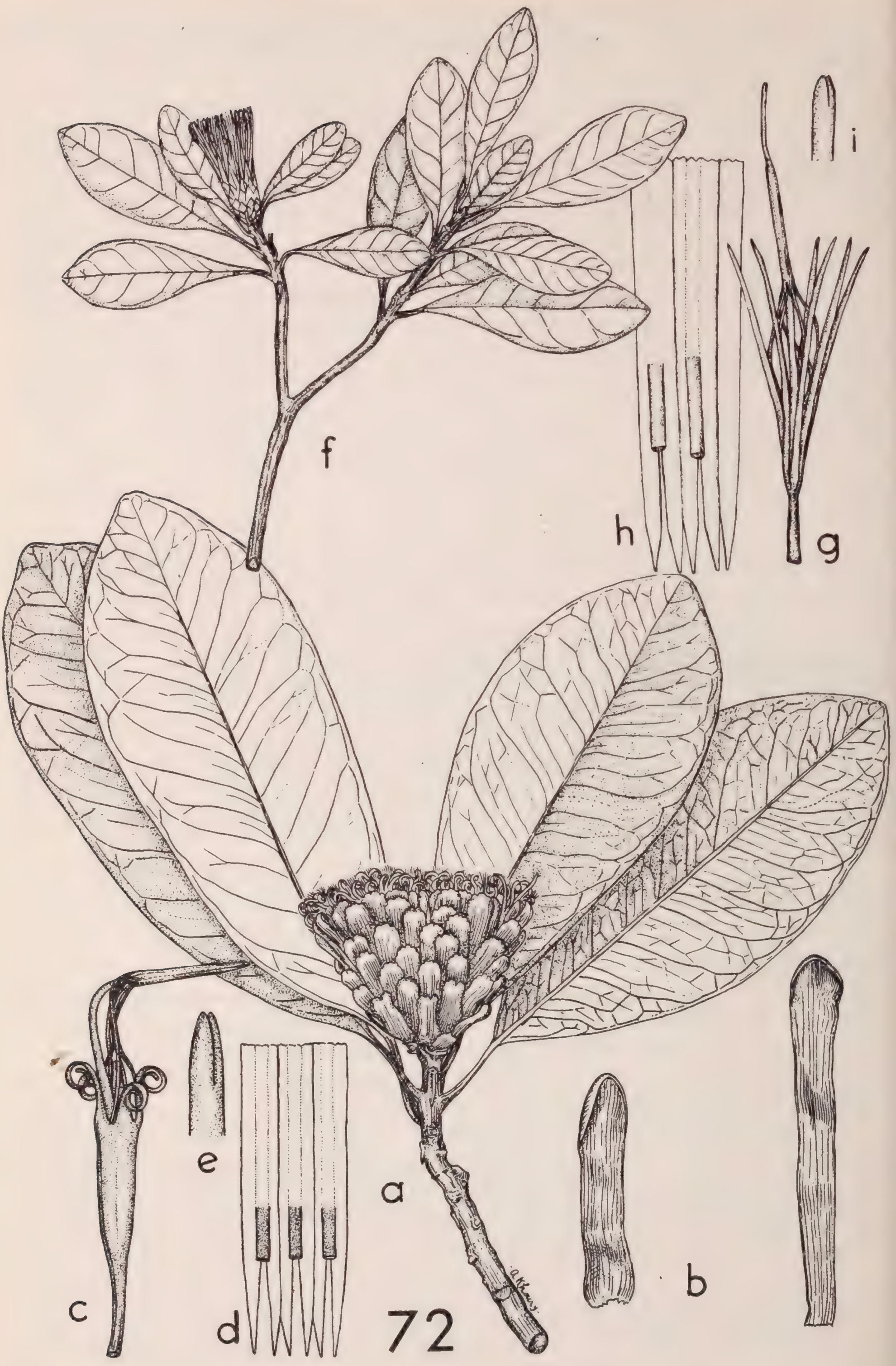
TYPE: Savanna Hill at 4400 ft alt., Cerro Duida, Amazonas, Venezuela, *Tate 759* (NY).

Known only by the type collection.

11. **Stenopadus eurylepis** Blake, Bull. Torrey Club 58: 492. 1931.

TYPE: Agüita, at 3100 ft alt., Cerro Duida, Amazonas, Venezuela, *Tate 935* (NY).

Known only by the type collection.



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12. **Stenopadus cucullatus** Maguire & Wurdack, sp. nov. (Fig. 72.)

Arbor mediocris vel 20 m alta, 30 cm diam.; ramulis teretibus, compacte fulvo-sericeis cum trichomis malpighioideis; foliis alternatis, laminis glabris firme chartaceis, valde reticulatis; plus minusve ellipticis, 12-24 cm longis, 6-11 cm latis, apice obtuso vel late breviacuminato saepe conduplicato, basi acutiuscula saepe inaequilatera conduplicataque; petiolo 2-3 cm longo, tenuiter sericeo, (in sicco) sulcato; capitulo solitario, terminali, sessili, majusculo plus minusve 100-floro homogamo; involucro hemisphaerico vel late campanulato, 3.5-4.5 cm alto, 10-12-seriato; phyllariis plus minusve 100, gradatis, inferioribus 12-15 mm longis, lanceolatis obtusis externe puberulis; superioribus 15-38 mm longis, 8 mm latis, glabris deorsum, late obtuse cucullatis, marginibus scariosis; intimis lineari-oblongis vel oblanceolatis, ca. 3 mm latis, glabris deorsum, receptaculo plano, glabro, alveolato, numerose paleaceis, paleis phyllariis interioribus similibus sed 0.6-0.8 mm latis, ad apicem dilatatis; corollis subcarnosis, tubo 20-22 mm longo, subventricoso-hypocrateriformi, lobis 12-14 mm longis, valde circinnatis, acutis; filamentis ca. 10 mm longis, in sinibus affixis; antheris ca. 14 mm longis, appendicibus apicalibus 3-4 mm longis, acutis, appendicibus caudalibus sagittatis, 3 mm longis, linearibus, glabris, acutis, adjacentibus omnino connatis; stylis subulatis ca. 50 mm longis, sursum asperulis, ramulis ca. 1.2-1.4 mm longis, obtusis, non differentiatis; achaeniis prismaticis glabris fusco-rubris 10-nervatis, ca. 10 mm longis; annulo inconspicuo; corona 0.7-0.8 mm alta, aliquantum prismatica, persparse pilosa ad apicem; pappo stramineo ca. 25 mm longo, setis 4-5-seriatis, filiformibus aliquantum compressis ad basim, minute barbellatis sursum.

TYPE: tree to 20 m high, 25 cm diam., involucral bracts russet-brown; corollas and styles lavender; anthers yellow; occasional in mixed montane forest at 1000 m alt., Cerro Yutaje, Río Manapiare, Terr. Amazonas, Venezuela, February 4, 1953, *B. Maguire & C. K. Maguire 35053* (NY). Paratypes: Cerro Yutaje: tree 5-8 m high, *Maguire & Maguire 35029;* tree 8 m high, 1400 m alt., *Maguire & Maguire 35120.* Cerro Coro-Coro, Serranía Yutaje: tree 3-6 m, *Maguire & Maguire 35459;* 1200 m alt., *Maguire & Maguire 35491.*

13. **Stenopadus cardonae** Maguire & Lasser, Mem. N. Y. Bot. Gard. 8: 150. 1953.

TYPE: Cerro Arepauchi, Río Caroní, Bolívar, Venezuela, *Cardona 1181* (NY).

Distribution. Small trees of the Gran Sabana, Venezuela, and adjacent British Guiana.

14. **Stenopadus affinis** Maguire, Steyermark & Wurdack.

Described in "Botany of the Chimantá Massif."[20]

15. **Stenopadus colombianus** Cuatrecasas & Steyermark, Bot. Mus. Leafe. 17: 99. 1955.

TYPE: Cerro Isibukuri, Río Kananari, Vaupés, Colombia, *Schultes & Cabrera 15031* (F).

Known only by the type collection.

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[20] Mem. N. Y. Bot. Gard. 9:393-439. 1957.

Explanation of figure 72

FIG. 72. *a-e, Stenopadus cucullatus. a,* habit, × ½; *b,* phyllaries, × 1½; *c,* corolla, × 1½; *d,* diagramatic representation of portion of the base of the anthers showing the caudal appendages, × 10; *e,* style branches, × 10. *f-i, Stomatochaeta cylindrica. f,* habit, × ½; *g,* corolla, × 2; *h,* portion of anther base, × 20; *i,* style branches, × 10.

Stifftia Mikan.

Stifftia chrysantha Mikan, Del. Bras. *pl. 1.* 1820.

Stifftia parviflora D. Don, Trans. Linn. Soc. 16: 294. 1830.

Stifftia uniflora Ducke, Rodriguesia 2: 157. 1936.

There is some doubt that *Stifftia uniflora* is generically compatible with the other two components of *Stifftia*, yet it is more closely allied with them than to other members of the Gochnatinae. These brief remarks will apply to the three species as though they are congeneric.

In general facies, *Stifftia* is easily distinguishable from *Stenopadus* (with which it has been sometimes associated). It is a glabrous shrub with slender branches, thin, elliptic, acute, slender-petioled leaves, and solitary large-heads or smaller heads paniculately arranged. The flowers are more or less similar in form to those of *Stenopadus*, but have more advanced vasculation, more highly specialized pollen grains,[21] and more highly differentiated style-branches (as noted in our "key").

Elsewhere it has been suggested that *Stifftia* (sensu lat.) constitutes a discrete phyletic line anciently cut off from *Stenopadus* (as have been other phyletic segregates, viz. *Chimantaea, Stomatochaeta,* and *Quelchia*), and now (except *Stifftia uniflora*) occupies the trans-Amazon region of central and southern Brazil.

Stomatochaeta (Blake) Maguire & Wurdack, stat. nov.

Stenopadus subgen. *Stomatochaeta* Blake, Bull. Torrey Club 58:490. 1931.

Heads solitary, terminal, few-flowered (10–20 [30]); involucre strongly gradate; receptacle plane or shallowly convex, epaleaceous except for 2–4 very narrow marginal pales, or in two species also with 1–4 additionally more centrally placed pales; corollas with internal hirsute collars, otherwise glabrous, the lobes stiffly erect, a lacking median vein, 2–4 times longer than the thin-textured 10-nerved tube; apical appendage of anthers sharply acute (ca. 3 mm long), caudal appendage sagittate, the tails linear, adjacent ones connate but easily separable; pollen grains yellowish, tricolpate, the furrows long-pointed; grains subprolate, sulosilate, the polar axis 45–50μ; styles asperulous toward the tip, the branches ascending or erect, short, obtusish, 0.5 mm or less long; achenes 6 mm or less long, glabrous, quadrangular, 10-nerved; annulus lacking; corona entire low (ca. 0.5 mm long) bordered externally by a ring of pilose hairs; pappus 4–6-seriate, the setae flattened and free at the base, minutely upwardly barbellate. Shrubs; leaves coriaceous with veins (except *S. cylindrica*) immersed; trichomes malpighioid.

TYPE: species: *Stomatochaeta crassifolia* (Blake) Maguire & Wurdack.

Key to the Species to Stomatochaeta

1. Microphyllous shrubs, with leaves normally 1–3 cm long, 2.5–20 mm broad, 1-nerved or with lateral veins most obscure; involucre 6–7-seriate.
    2. Leaves broadly to narrowly obovate (1.5) 2–3 (5) cm long, (0.7) 1.0–2.0 (3.0) cm broad; petioles 1–3 mm long; achenes 3 mm long; phyllaries glabrous. 1. *Stomatochaeta condensata.*
    2. Leaves oblong to oblong-oblanceolate, 10–26 mm long; 2.5–9.0 mm broad boat-shaped, strongly conferted, sessile; achenes 5–6 mm long; phyllaries thinly pilulose. 2. *Stomatochaeta cymbifolia.*

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[21] See Mem. N. Y. Bot. Gard. 9:441–452. 1957.

1. Macrophyllous shrubs with leaves normally 3–8 cm long, 2–5 cm broad; lateral veins quite evident; involucre 8–12-seriate.
   3. Leaf-blades usually 3–7 cm long, 1.0–2.5 cm broad; involucre cylindric-campanulate; phyllaries strigose-sericeous. 3. *Stomatochaeta cylindrica.*
   3. Leaf-blades usually 5–8 cm long, 3–5 cm broad; involucre broadly campanulate; phyllaries glabrous. 4. *Stomatochaeta crassifolia.*

1. **Stomatochaeta condensata** (Baker) Maguire & Wurdack, comb. nov.

Stifftia condensata Baker in Mart. Fl. Bras. 6^3: 351. 1884.
Stenopadus condensatus (Baker) Blake, Bull. Torrey Club 67: 299. 1940.
Stenopadus variabilis Blake, Brittonia 3: 202. 1939.
Stenopadus guaiquinimensis Badillo, Bol. Soc. Venez. Ci. Nat. 9: 136. 1944.

TYPE: "Habitat in Guiana Britannica: Rob. Schomb. N. 543!" (K). [Probably collected in Venezuela.]

Distribution. Widely distributed on open savannas, about thickets, and as a component of low brushland, Holi-tipu and the Ayanganna Savannas, British Guiana; the Gran Sabana and Cerro Guaiquinima, Venezuela, from 800 to 2000 m altitude on sandstone areas.

2. **Stomatochaeta cymbifolia** (Blake) Maguire & Wurdack, comb. nov.

Stenopadus cymbifolius Blake, Brittonia 3:201. 1939.

TYPE: Auyán-tepuí, at 2200 m altitude, Edo. Bolívar, Venezuela, December 1937–January 1938, *Tate 1322 (NY).*

Distribution. Known only by the type from Auyán-tepuí and from the nearby Chimantá-tepuí, where the small shrub is generally distributed on the cumbre above 2000 m altitude. Obviously most closely related to *S. condensata.*

3. **Stomatochaeta cylindrica** Maguire & Wurdack, sp. nov. (Fig. 72.)

Frutex, 2–5 m alto, ramulis 2–3 m diam., dense compacteque fulvo-strigulosis, cum pilis malpighioideis; laminis glabris basibus costis exceptis, coriaceis, (2.5)–3–7(9) cm longis; 1.0–2.5 (3.2) cm latis, oblanceolatis, rotundatis obtusis vel acutiusculis apicibus, basibus acutis; improminule pinnivenosis supra, prominulis subtus, venis 4–6-jugis, marginibus costato-involutis; petiolis 5–10 mm longis, strigulosis; capitulis cylindrico-campanulatis 8–15-floris homogamis; involucro 3.0–3.5 cm longo, 6–7 mm basi lato; phyllariis 35–40, 10–12-seriatis, gradatis, externe fulvo-strigoso-sericeis, inferioribus deltoideis ovatis 2–10 mm longis, interioribus lineari-lanceolatis attenuato-acuminatis, 12–30 mm longis; paleis receptaculi 1–2; phyllariis 2–3 marginalibus angustis; tubis corollae 6–7 mm longis glabris, piloso-hirsutis in collari intus; lobis linearibus 18–20 mm longis, ca. 0.4 mm latis, rigidis, erectis, 2-venosis, cum appendicibus triangularibus asperulis 5–6 mm longis; antheris 12–13 mm longis, appendicibus caudalibus linearibus ca. 3 mm longis connatis; achaeniis 6.0–6.5 mm longis, obscure 4-angulatis, glabris, annulis ca. 0.5 mm longis; pappo sordido ca. 20 mm longo, 5–6-seriato; setis delicate filiformibus, minute barbellatis supra.

TYPE: small flexuous tree 2–5 m high, flowers yellowish, fewer than 15, occasional about "bush islands" in *Stegolepis* savanna, 1 km east Cumbre Camp, at 1800 m altitude, Cerro Guaiquinima, Edo. Bolívar, Venezuela, Dec. 26, 1951, *Bassett Maguire 32782* (NY).

Besides the type, known otherwise also only from the cumbre of Guaiquinima, where it is conspicuous about thickets of forest margins: *Maguire 32728, 32855, 33003, 33062.*

4. **Stomatochaeta crassifolia** (Blake) Maguire & Wurdack, comb. mov.

Stenopadus crassifolius Blake, Bull. Torrey Club 58:493. 1932.

TYPE: Central Camp at 5000 feet altitude, Cerro Duida, Amazonas, Vene-

zuela, *Tate 1014* (holotype NY). In addition, known from Duida by *Tate 415* and *Steyermark 58354;* from Cerro Huachamacari by *Maguire, Cowan & Wurdack 30049, 30069, 30115, 30243, 30291;* and from Cerro Parú by *Cowan & Wurdack 31102, 31162.*

Frequent and generally distributed on breaks, escarpments and margins of thickets at 1500 m altitude or higher; the higher sandstone mountains of Terr. Amazonas, south of the Río Ventuari.

Glossarion Maguire & Wurdack, gen. nov.

Capitula mediocria, homogama 12–16-flora; involucro cylindrico-conico; receptaculo aliquantum convexo, alveolato, hirsuto, epaleaceo; phyllariis numerosis gradatis coriaceis; corollis ligulatis, ligula 5-dentato-lobata; filamentis in collo affixis; antheris sagittatis caudatis; appendicibus adjacentibus linearibus connatis; granis pollinis rubris, tricolpatis, sulcis longiacutis; granis sphaeroideis, spinulosis, axibus polaribus ca. 55μ; stylis laevibus, ramulis perlongis (3 mm) truncatis, dorso minute 3-lobatis; achaeniis probabiliter prismaticis, 10-costatis, annulo deficienti; corona 5-brevilobata; pappo uniformi, setis capillaribus. Frutex; foliis alternis; basibus petiolorum semivaginatis; unitypicis.

TYPUS: *Glossarion rhodanthum* Maguire & Wurdack.

Glossarion is a diminutive of glossa (γλωσσα), tongue.

Glossarion rhodanthum Maguire & Wurdack, sp. nov.

Frutex 2–10 dm altus, saepe depressus; ramulis dense fulvo-piloso-tomentosis, saepe argenteis, internodiis 4–6 mm longis; foliis alternis petiolatis; laminis subcoriaceis ellipticis vel elliptico-oblanceolatis, (4) 6–11 cm longis, (1.0) 1.5–4.0 cm latis, supra glabris, subtus dense fulvo-tomentosis; margine revoluta; costa prominenti, supra immersa, nervis lateralibus prominulis 18–20-jugis, venis ultimis reticulatis; apice acutiusculo, basi acuta vel acuminata; petiolo 1.5–2.5 cm longo, ad basim in semivaginam 1.0–1.5 cm lata expansa; capitulo solitario terminali vel pseudoterminali vel manifeste laterali 12–16-floro, homogamo, brevipedunculato, bracteato, 1–2 cm longo; bracteis lancoelatis acutissimis dense piloso-tomentosis, inferioribus late lanceolatis, 5–7 mm latis, 10–20 mm longis, superioribus lineari-lanceolatis, 2–4 mm latis, 25–30 mm longis; involucro cylindrico-conico 3.8–4.2 cm longo, 8–10-seriato, phyllariis valde gradatis lanceolatis acutissimis, tenuiter lanoso-canescentibus, demum glabrescentibus, marginibus valde piloso-ciliatis; receptaculo aliquantum convexo, alveolato, hirsuto, epaleaceo; corollis ligulatis rubris, ligula ca. 20 mm longa, 4–5 mm lata, ad apicem circinnata, lobis 5, oblongo-deltoideis, ca. 0.8 mm longis, obtusiusculis, pilosis; tubo ca. 1 cm longo; filamentis 12–14 mm longis, in collari insertis, 1 mm subter sinu; antheris ca. 20 mm longis, appendicibus apicalibus ca. 2.5 mm longis, acutis; appendicibus caudalibus sagittatis, 6–7 mm longis, linearibus, adjacentibus omnino connatis; stylis glabris laevibus 28–30 mm longis; ramulis patentibus ca. 3 mm longis, truncatis, dorso minute 3-lobatis; achaeniis 7–8 mm longis, glabris, 10-costatis; annulo deficienti; corona ca. 0.4 mm longa, aliquantum 5-lobata; pappo sordido, ca. 2 cm longo, setis uniformibus, capillaribus, minute barbellatis, in circulo affixis.

TYPE: shrub 1–2 dm high, leaves coriaceous, densely tan-tomentose beneath, bracts reddish, tomentose, corollas bright orange-red, common in low scrub bush, slopes vicinity Cumbre Camp at 1700 m alt., Cerro de la Neblina, Amazonas, Venezuela, January 4, 1954, *Maguire, Wurdack & Bunting 37027* (NY). Paratypes, Cerro de la Neblina, *Maguire, Wurdack & Bunting: 37004, 37089, 37126, 37149, 37190.*

Distribution. Known only from the cumbre of Neblina, where *G. rhodanthum* is

a branched shrub from 1–20 dm high, upright in thickets and protected areas, often depressed on wind-swept sites.

Three genera of Guayanan Mutisieae, viz., *Quelchia* with regular corollas, and *Achnopogon* and *Neblineae* with bilabiate corollas, have laterally disposed, axillary, compound inflorescences. Peculiar to the three genera (ours), the central axis is monopodial, continuing to grow vegetatively. All other members of the Guayan Mutisieae have large massive many-flowered heads that seem to terminate the axes, hence the stem development is sympodial. The large, relatively massive, solitary heads of *Glossarion* seem to be axillary and lateral, the central axis thereby being monopodial, as is characteristic of the lianoid genus *Mutisia.*

This, if accurately interpreted, cuts across the otherwise prevailing correlation of monopodial development and compound laterally disposed inflorescences on the one hand, and sympodial development and large solitary heads on the other.

Gongylolepis benthamiana Rob. Schomb. var. **pubescens** Maguire & Wurdack, var. nov.

Var. *benthamianae* similis sed ramis foliisque et axibus inflorescentiarum dense sericeo-tomentosis, demum plus minusve glabrescentibus; paniculis multicapitatis, capitulis 12–15.

TYPE: shrub or small tree to 5 m high, extreme pubescent form, rocky slopes and elevations, savannas, north side of Río Aponguao, Gran Sabana, at 1200 m alt., Edo. Bolívar, Venezuela, March 27–28, 1952, *Bassett Maguire 33640* (NY).

Typically *G. genthamiana* is glabrous and has fewer than eight heads. The new variety is fairly common in the type locality, and seems to be the prevailing form there.

Gongylolepis huachamacari Maguire subsp. **neblinensis** Maguire & Wurdack, subsp. nov.

Subsp. *huachamacari* similis sed ramis glabris vix pilosis in axillis foliorum; foliis angustioribus 7–12 cm longis, 15–25 mm latis; inflorescentiis pervalde corymbosis non umbellatis; corollis antherisque flavidis non purpureis.

TYPE: small tree to 4 m high, involucral bracts maroon, corollas and anther tubes cream-colored, styles maroon, locally frequent, intervale beyond Ridge No. 3, Southwest Escarpment at 1800 m alt., Cerro de la Neblina, Amazonas, Venezuela, January 20, 1954, *Maguire, Wurdack & Bunting 37353* (NY).

Neblinaea Maguire & Wurdack, gen. nov.

Capitula parva, 2–5 flora, homogama, in cymis lateralibus dispositis; involucro anguste cylindrico; phyllariis multiseriatis (12–15) gradatis, oblongo-oblanceolatis vel oblanceolatis, pergamentaceis; receptaculo parvo hemisphaerico epaleaceo hirsuto, minute carnoso squamuloso; corollis submembranaceis bilabiatis, tubo 5 (8)-nervato, labia exteriore aliquantum arcuata minute 3-dentata, 6(8)-nervata, labis interiore profunde 2-partita, lobis linearibus valde circinnatis, 2-nervatis; antheris caudato-sagittatis, appendicibus apicalibus anguste triangularibus, appendicibus caudalibus dense puberulis adjacentibus connatis; granis pollinis luteis, tricolpatis, sulcis longiacutis, granis subprolatis, spinulosis, axibus polaribus ca. 50μ; achaeniis plus minusve angulari-teretibus, obscure 5 (10)-costatis, annulo non evidenti, disco pappifero evidenti, pappo pauci(3)-seriato, setis filiformibus minute barbellatis. Frutex ramosus; foliis oblanceolatis chartaceo-coriaceis, reticulato-pinninervatis, plus minusve sessilibus.

TYPUS: *Neblinaea promontoriorum* Maguire & Wurdack.

Neblinaea promontoriorum Maguire & Wurdack, sp. nov.

Frutex ramosus, 1–2 m altus; ramulis teretibus 3–4 mm diam., internodiis 1–3 mm longis, dense fulvo-sericeis; foliis oblanceolatis, semisessilibus, moderate chartaceo-coriaceis, pinninervatis reticulatis; laminis (2) 4–8 cm longis, (0.6) 1.0–1.5 cm latis, apice obtuso, basi acuminata, costa prominenti, venis prominulis; petiolo alato, 2–4 mm longo; inflorescentiis lateralibus, in axillaribus foliorum dispositis, cymosis 2-6-capitatis, ramulis 1–2 cm longis pubescentibus bracteatis, bracteis lanceolatis acuminatis, 3–4 mm longis, caducis; capitulis anguste cylindricis, 2.0–2.5 cm longis, 3–5 mm latis, phyllariis 12–15-seriatis, pergamentaceis, fulvo-ciliatis, ad basim improminule 7 (9)-nervis, inferioribus triangulari-ovatis, 3–4 mm longis, acutis minute ciliolatis, mediis oblongo-oblanceolatis, 6–8 mm longis, 3–4 mm latis, apice acutiusculo; receptaculo hemisphaerico ca. 1.5 mm diam., sparse hirsuto, epaleaceo, aliquantum alveolato minute carnoso squamuloso; floribus 2–5, corollis submembranaceis bilabiatis, tubo ca. 6 mm longo, supra ca. 1.5 mm diam., 5 (8)-nervato, lobo posteriore 7–8 mm longo, ca. 3 mm lato, late elliptico, minute tridentato, 6 (8)-nervato; lobo anteriore profunde bifido, segmentis linearibus 6–7 mm longis, ca. 0.6 mm latis circinnatis, 2-nervatis, apice acuto; antheris ca. 9 mm longis, appendicibus apicalibus anguste triangularibus, ca. 0.5 mm longis, appendicibus caudalibus ca. 2 mm longis, dense puberulis, linearibus acutiusculis adjacentibus connatis; filamentis 2.5–3.0 mm longis, in tubo affixis; stylo 13–14 mm longo, ad basim bulboso, ramulis ca. 1 mm longis, rotundatis, glabris, non differentiatis; achaeniis 6–7 longis, plus minusve angulari-teretibus, 5 (7)-nervatis, exannulatis vel minute annulatis, minute coronatis; pappo fulvo, 11–13 mm longo, setis 3-seriatis, filiformibus, numerosis, minute barbellatis, in disco 0.5–0.6 mm alto dispositis.

TYPE: branched shrub 1–2 m high, inflorescences lateral and axillary, flowers 3–5 per head, white, frequent in low scrub vegetation, West Escarpment, Cerro Neblina, at 1850 m alt., January 10, 1954, *Maguire, Wurdack & Bunting 37009* (NY). Paratypes: shrub to 2 m high, flowers 2–5, white, frequent along escarpment at 1900 m alt., 5 km west Cumbre, Cerro Neblina, January 10, 1954, *Maguire, Wurdack & Bunting 37016*; shrub, frequent, along West Escarpment at 1800 m, Cerro Neblina, January 6, 1954, *Maguire, Wurdack & Bunting 37082.*

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BOTANY OF THE CHIMANTÁ MASSIF—I
GRAN SABANA, VENEZUELA[22]

BASSETT MAGUIRE, JULIAN A. STEYERMARK, JOHN J. WURDACK,
AND COLLABORATORS

The Chimantá Massif, probably the largest of the Roraima-formation mountains, has been the object of joint exploration by the New York Botanical Garden and the Chicago Natural History Museum. Parts of the massif (Abácapa-tepuí and Acopan-tepuí) had earlier been visited briefly by Captain Felix Cardona. During January and February, 1953, The New York Botanical Garden in conjunction with the American Museum of Natural History visited the east-central slopes of the Massif and the east cumbre of Churi-tepuí (Muru-tepuí). From March to July of the same year, under the same arrangement, the Chicago Natural History Museum expedition collected on the western and southern slopes and cumbres (Abácapa-tepuí, Torono-tepuí, and Apácara-tepuí). The joint expedition in January, February, and March of 1955 explored the slopes and cumbres of the central part of the Massif and adjoining Apácara and Torono-tepuís.

The botanical materials of these three expeditions are being studied jointly by the Chicago Natural History Museum and The New York Botanical Garden, and are to be reported upon under the above title. In addition, materials obtained by The New York Botanical Garden in 1952 from the Gran Sabana, Ptari-tepuí and Sororopán-tepuí, and incidental collections made by Captain Felix Cardona on the Chimantá massif and on Auyán-tepuí are included herein. Geographical notes obtained on the Chimantá expeditions will be published at a later date.

The collected materials of certain families of The New York Botanical Garden field operation to date have been presented in "Botany of the Guayan Highland—Part II." Collaborators who studied the larger body of materials have made occasion also to review the specimens of the same families (viz. Gramineae, Eriocaulaceae, Bromeliaceae, Piperaceae and Annonaceae) for the present article.

By mutual agreement, the Chicago Natural History Museum and The New York Botanical Garden will hold in abeyance the further study and publication of Chimantá collections until the publication of the larger body of Guayana materials will have been completed.

GRAMINEAE[23]

1. **Myriocladus gracilis** Swallen, sp. nov. (Fig. 74.)

Culmi graciles, dense caespitosi, 50–75 cm alti, multinodi, pauciramosi; vaginae strigosae, truncatae, in ore fimbriatae; laminae 10–17 mm longae, ca. 2 mm latae, rigidae, acutae, nervosae, appressae, basi brevipetiolatae, marginibus sparse scabrae vel hispidae; inflorescentiae usque ad 2 cm longae, 3-5-

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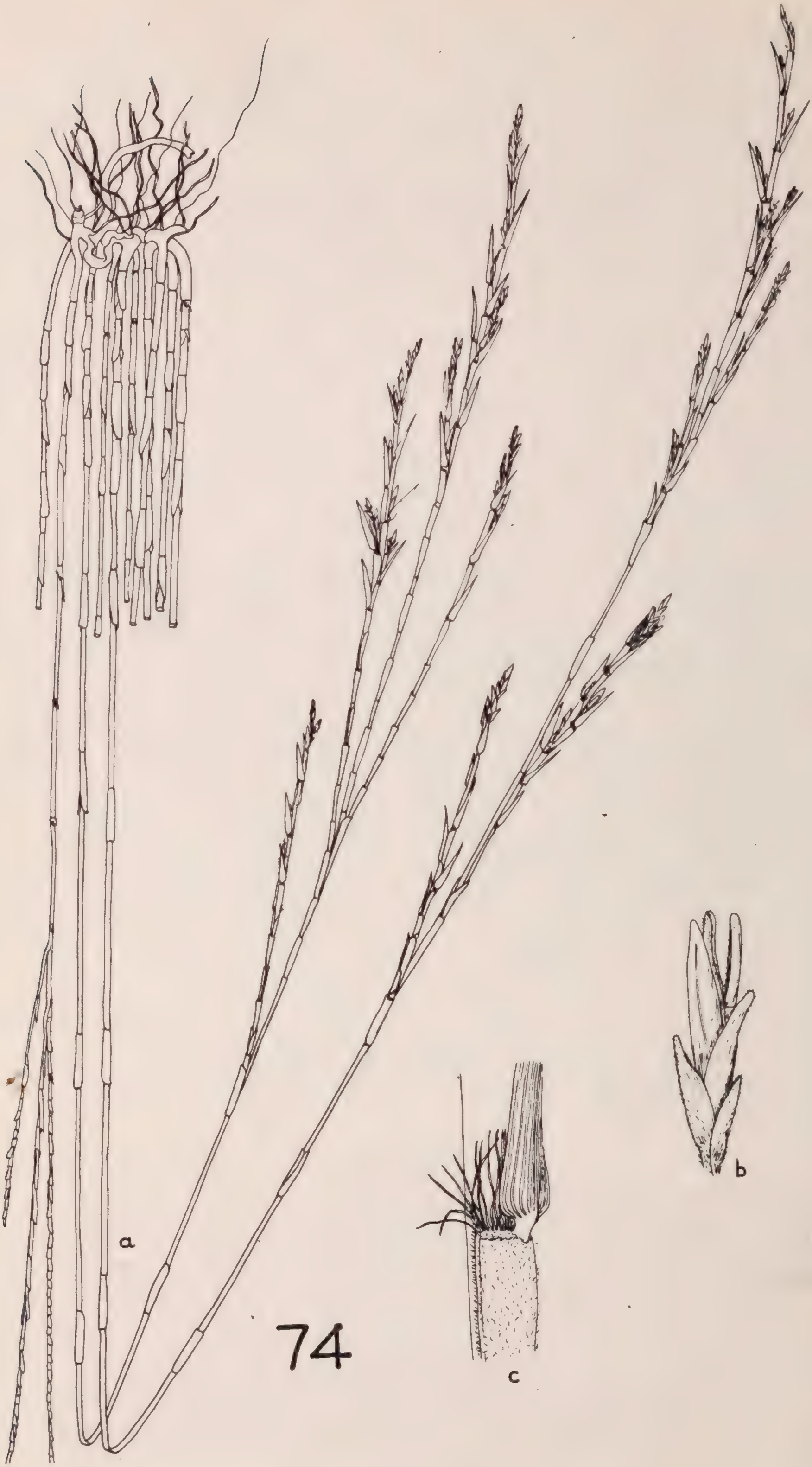
[22] Footnotes and figures in this paper are numbered consecutively with those of "Botany of the Guayana Highland—Part II" (Mem. N. Y. Bot. Gard. 9:235–392. 1957).

[23] By Jason R. Swallen, except *Ischaemum* and *Andropogon* by Ernest R. Sohns.



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spiculatae, axe pedicellisque dense pubescentibus; rachilla pilosa; glumae obtusae, pubescentes, prima 1.5–2.5 mm longa, secunda 2–3 mm longa, plerumque arista crassa ca. 1 mm longa; lemma sterile 4 mm longum, sparse pubescens, ad summum compressum, apice glabrum; lemma fertile 5–5.2 mm longum, lemma sterile simulans, ad summum pubescens; palea lemma aequans vel superans, concava, in parte superiore pubescens, apice angusta, truncata, dense hispidula, carinis hispido-ciliatis.

Culms densely tufted, without elongate internodes, wiry, erect from a knotty, rhizomatous base, simple or with a few primary branches from some of the upper nodes, the flowering culms 50–75 cm tall, apparently with some shorter sterile culms intermixed; internodes mostly 2–3 cm long; sheaths much shorter than the internodes, becoming crowded and overlapping toward the top of the sterile culms and on the primary branches, persistent, the blades deciduous except the flowering portion, strigose-pubescent, truncate, fimbriate in the throat, the rim somewhat thickened but inconspicuous; blades 10–17 mm long, about 2 mm wide, rigid, appressed, rounded at the base to a short, thick petiole much narrower than the mouth of the sheath, bluntly acute, strongly nerved, the margins rather sparsely appressed scabrous or hispid, otherwise glabrous; inflorescence not more than 2 cm long with 3–5 appressed spikelets, partly enclosed in the sheath, terminal on the primary branches but usually on very short branchlets, the rachis and pedicels densely pubescent; spikelets 2-flowered, the upper rudimentary, the rachilla pilose, the segment between the sterile and fertile lemma 1 mm long, thick, the segment between the fertile lemma and rudiment more slender, 2.5 mm long; glumes usually obtuse, pubescent, the first mostly 2 mm (1.5–2.5) long, the second 2–3 mm long, commonly with a thick awn almost 1 mm long; sterile lemma 4 mm long, sparsely pubescent, somewhat compressed toward the smooth, round, beak-like tip; fertile lemma 5–5.2 mm long, similar to the sterile lemma, pubescent only toward the tip, the beak more prominent; palea as long as or somewhat longer than the lemma, compressed, deeply concave with very broad margins, pubescent in the upper half, the narrow tip truncate, densely hispidulous, the keels conspicuously hispid-ciliate.

TYPE: locally frequent, island in Río Tirica above Middle Falls below Summit Camp, alt. 1925 m, Central Section, Chimantá Massif, Bolívar, Venezuela, February 5, 1955, *Julian A. Steyermark & John J. Wurdack 489* (US 2,182,094).

2. **Myriocladus steyermarkii** Swallen, sp. nov. (Mem. N. Y. Bot. Gard. 9:247,*f.3,a.*)

Culmi erecti, graciles, ca. 90 cm alti, summo ramosi, in parte 1/3 inferiore 6-nodosi, internodiis 6–11 cm longis et vaginis 1.5–2 cm longis; rami 9–17 cm longi ramulis brevibus appressis; vaginarum pars manifesta ca. 5 mm longa, strigosa, truncata, in ore fimbriata; laminae 9–14 mm longae, 1.5–2 mm latae, appressae, nervosae, brevipetiolatae, marginibus scabrae; inflorescentia usque ad 1.5 cm longa, 3–5-spiculata, axe pedicellisque dense pubescentibus; spiculae 2-florae, superior reducta; glumae acutae vel breviaristatae, pubescentes, ciliatae, prima 1–2.5 mm longa, secunda 2–2.5 mm longa; lemma sterile 3–3.5 mm longum, obtusum, pubescens, ciliatum; lemma fertile 3.8–4.2 mm longum, lemma sterile simulans; palea lemmate sterile longior, inter carinam pubescens, carinis ciliata, apice angusta, truncata.

Explanation of figure 74

FIG. 74. *Myriocladus gracilis* Swallen. *a*, plant, × ½; *b*, spikelet, × 5; *c*, junction of sheath and blade, × 5. Drawings by LaVerne Helen Richardson.

Culms erect, wiry, about 90 cm high, with numerous slender branches on the upper third, the lower part about 6-noded, the internodes 6–11 cm long, the persistent sheaths 1.5–2 cm long; branches 9–17 cm long, with short appressed branchlets above the middle; exposed portion of sheaths about 5 mm long, strigose-pubescent, truncate, fimbriate in the throat, the rim inconspicuous; ligule about 0.3 mm long; blades 9–14 mm long, 1.5–2 mm wide, appressed, firm, strongly nerved, rounded at the base to a short, thick petiole, the margins appressed-scabrous; panicles not more than 1.5 cm long, just exserted from the sheath, bearing 3–5 short-pedicellate, appressed spikelets, the axis and pedicels densely pubescent; spikelets 2-flowered, the upper floret rudimentary, the rachilla-segment between the sterile lemma and fertile floret 0.5 mm long, glabrous, the segment between the fertile floret and rudiment 1.5 mm long, glabrous, or pubescent toward the top; glumes pubescent, ciliate, often with a stout awn 0.5–1.5 mm long, the first 1–2.5 mm long, the second 2–2.5 mm long, not including the awn; sterile lemma 3–3.5 mm long, obtuse, pubescent, ciliate, the midnerve thickened at the tip; fertile lemma similar to the sterile lemma, 3.8–4.2 mm long; palea distinctly longer than the lemma, pubescent between the keels and on the margins in the upper half, the keels ciliate, the tip narrow, truncate.

TYPE: frequent, rocky escarpment between west and east branches of Río Tirica, alt. 2260 m, Central Section, Chimantá Massif, Bolívar, Venezuela, February 13, 1955, *Julian A. Steyermark & John J. Wurdack 819* (US 2,182,095).

14. **Myriocladus variabilis** Swallen, sp. nov. (Mem. N. Y. Bot. Gard. 9:248, *f. 4, a.*)

Culmi rhizomatosi, erecti, graciles, usque ad 3 m alti, summo ramis 2, 55–65 cm longis; vaginae paucae, 5–6 cm longae, suprema longior, glabrae, in ore dense fimbriatae, ligula exteriore tenui, 1 mm longa, erosa vel ciliata; laminae 24–28 cm longae, 4.3–4.8 cm latae, acuminatae, glabrae, petiolatae, marginibus scabrae; culmorum sterilium laminae 28–29 cm longae, 5–6 cm latae, marginibus scabrissimae; panicula 38–50 cm longa, ramis paucifloris patentibus, inferioribus usque ad 10 cm longis ramulis brevibus distantibus divergentibus; superioribus brevibus unifloris; spiculae 1–1.5 cm longae, distantes, appressae vel patentes, pedicellis usque ad 5 mm longis, floribus fertilibus 2–5; glumae variabiles, angustissimae, subattenuatae, vel latae, acutae vel breviaristatae, hispadae, prima 1.5–3 mm longa vel nulla, secunda 2–5.5 mm longa; lemma sterile 3–4.5 mm longum, acutum vel subobtusum, rare mucronatum, summo hispidulum; lemma fertile primum 4.5–5.5 mm longum, subacutum, summo hispidulum; palea quam lemma multo brevior vel longior, abrupte acuta vel anguste truncata, inter carinam sparse pilosa, summo hispidula.

Flowering culms as much as 3 m high, erect from rhizomes, relatively slender, about 4 mm thick near the base, with two small groups of shortened internodes, the upper group bearing two branches; sheaths few, 5–6 cm long, the uppermost longer, glabrous, the rim rather thin, 1 mm long, minutely erose or ciliate, densely fimbriate in the throat, the hairs elongate, tangled; blades 24–28 cm long, 4.3–4.8 cm wide, acuminate, rounded to a thick, petiole-like base about 2 mm long, glabrous, scabrous on the margins; blades of sterile culms 28–29 cm long, 5–6 cm wide, the margins very scabrous; inflorescence 38–50 cm long, open, the lower branches as much as 10 cm long, with short, distant, divergent branchlets, becoming shorter upward, but not crowded, bearing 3 or 4 spikelets, or those at the summit with a single spikelet, the axis and branches densely villous; spikelets 1–1.5 cm long, distant, appressed or stiffly spreading, with 2–5 fertile florets, the pedicels as much as 5 mm long; glumes very variable, very narrow, subattenuate, to rather broad, acute, sometimes with a short awn, hispid at least at the summit, the first 1.5–3 mm long, occasionally undeveloped, the second 2–5.5 mm long; sterile lemma 3–4.5 mm long, acute or subobtuse, rarely mucronate, the tip hispidulous; fertile lemmas 4.5–5.5 mm long, subacute, more or less hispidulous at the summit; palea much shorter to longer than the lemma, abruptly acute or narrowly truncate, the nerves sometimes minutely excurrent, sparsely pilose between the keels, the tip hispidulous.

TYPE: in recesses of deep fissures, in moist ground with shrubs and small trees, east-central portion of summit of Apácara-tepuí, alt. 2450–2500 m, Chimantá Massif, Bolívar, Venezuela, June 21–22, 1953, *Julian A Steyermark 75879* (US 2,182,908).

16. **Myriocladus confertus** Swallen, sp. nov. (Mem. N. Y. Bot. Gard. 9:248, *f.4,c.*)

Culmi caespitosi, erecti, 65–125 cm alti, glabri, internodiis brevibus et elongatis alternatis, ramosi; vaginae ca. 7 cm longae, ligula exteriore minute ciliata 1 mm longa, in ore dense fimbriatae; ligula 1 mm longa, minute erosa vel ciliata; laminae usque ad 15 cm longae, 3.5–4 cm latae, acutae, brevipetiolatae; panicula 40–45 cm longa, ramis numerosis anguste adscendentibus, inferioribus 8–9 cm longis, axe, ramis, pedicellisque glabris; spiculae 2–3-florae, suprema reducta; gluma prima angusta, acuta vel subobtusa, 2.0–2.3 mm longa, glabra, vel summo sparse pilosa; gluma secunda et lemma sterile aequalia, 3–3.3 mm longa, gluma acuta, lemma latius, obtusum; lemma fertile primum 4.5–5 mm longum, obtusum, glabrum, lucidum; palea acuta, glabra, lemma aequans vel superans.

Culms in small clumps, erect, 65–125 cm high, glabrous; lowest internodes very short, with short, early deciduous, bladeless sheaths, the next internode elongate, as much as 55 cm long, succeeded by numerous very short internodes, the sheaths crowded, about 7 cm long, the upper somewhat elongate, bearing at the summit a membranaceous, minutely erose rim about 1 mm long, with a dense mass of tangled bristles on the sides extending inward behind the ligule; ligule about 1 mm long, minutely erose or ciliate; blades as much as 15 cm long, mostly 3.5–4 cm wide, acute, gradually narrowed from near the broadly rounded base, this abruptly narrowed to a short, thick petiole; inflorescence 40–45 cm long, the numerous branches narrowly ascending or somewhat spreading, the lower ones somewhat distant, sometimes with short branchlets, 8–9 cm long, becoming shorter and more crowded upward, the axis, branches, and pedicels glabrous; spikelets 2–3-flowered, the upper floret reduced or rudimentary; first glume narrow, acute or subobtuse, 2.0–2.3 mm long, glabrous, sometimes with a few hairs at the tip; second glume and sterile lemma equal, 3–3.3 mm long, the glume similar to the first glume, usually acute, the lemma broader, obtuse; lemma of the first fertile floret 4.5–5 mm long, gradually narrowed to the obtuse tip, usually purple, smooth and shining; palea acute, glabrous, equaling or somewhat exceeding the lemma.

TYPE: west side of Middle Falls of Río Tirica below Summit Camp, alt. 1760 m, Chimantá Massif, Torono-tepuí, Bolívar, Venezuela, March 1, 1955, *Julian A. Steyermark & John J. Wurdack 1220* (US 2,182,098).

18. **Myriocladus purpureus** Swallen, sp. nov. (Mem. N. Y. Bot. Gard. 9:248, *f.4,e.*)

Culmi 3–4 m alti, ramis 1–4 fasciculatis; vaginae ca. 7 cm longae, confertae, glabrae, costo crasso, ligula exteriore brevissima minute ciliata; ligula crassa, 1–1.5 mm longa; laminae lanceolatae, acutae, 18–20 cm longae, 4–5 cm latae, superiores breviores, glabrae, marginibus scabrae; paniculae 60–75 cm longae, racemis numerosis adscendentibus vel patentibus, inferioribus 3–4 cm longis, superioribus brevioribus, axe, ramis, pedicellisque pubescentibus; spiculae appressae, 3–4-florae, suprema reducta; gluma prima angusta, acuta vel sub-

obtusa, 1.5–2 mm longa, summo sparse pilosa; gluma secunda 2.5–3 mm longa, mucronata; lemma sterile 3.5 mm longum, obtusum; lemma fertile 5 mm longum, obtusum, glabrum, summo minute ciliatae, crassum; palea lemma aequans vel superans.

Leafy shoots 1.5 m tall; flowering culms 3–4 m tall, the flowering branches in fascicles of 1–4; sheaths of the branches about 7 cm long, crowded, glabrous, the back thickened, with a very short, minutely ciliate rim at the summit; ligule thick, 1–1.5 mm long; blades lanceolate, acute, 18 cm to more than 20 cm long, 4–5 cm wide, or the uppermost smaller, broadly rounded at the base but not cordate, glabrous, the margins somewhat scabrous; inflorescence 60–75 cm long, the numerous racemes stiffly ascending or spreading, the lower somewhat distant, 3–4 cm long, becoming gradually shorter upward, the tip dense, spikelike, the axis, branches and pedicels pubescent; spikelets appressed, 3–4-flowered, the uppermost floret reduced or rudimentary, first glume narrow, acute or subobtuse, 1.5–2 mm long, with a few hairs at the summit; second glume similar to the first, 2.5–3 mm long, the thick midnerve excurrent in a short mucro; sterile lemma 3.5 mm long, obtuse, the midnerve thickened at the summit, sometimes excurrent, bearing a few short hairs; first fertile floret 5 mm long, the lemma obtuse, glabrous, the tip sometimes minutely ciliate, the midnerve thickened at summit, but not excurrent; palea equlaling the lemma or slightly exceeding it.

TYPE: summit, at edge of escarpment in and among zanjones, alt. 2165–2180 m, Chimantá Massif, Torono-tepuí, Bolívar, Venezuela, February 9, 1955, *Julian A. Steyermark & John J. Wurdack 658* (US 2,182,096).

19. **Myriocladus wurdackii** Swallen, sp. nov. (Mem. N. Y. Bot. Gard. 9:248, *f.4,f.*)

Culmi usque ad 4 m alti, summo ramis 2–3, 100–110 cm longis; vaginarum pars manifesta 1–2 cm longa, glabra, subtruncata, in ore fimbriata; laminae 15–20 cm longae, 2.7–4.7 cm latae, acuminatae, basi 4 mm latae, glabrae, marginibus plus minusve scabrae; inflorescentia 30–38 cm longa, 5–6 cm lata, multiramosa, axe hirsuto; rami divirgentes, hirsuti, inferiores ramulis brevibus patentibus; spiculae flosculis fertilibus 1 vel 2, distantibus; rachilla gracilis, glabra, inter lemma sterile et lemma fertile 1.5 mm longa; gluma prima 2–2.5 mm longa, angusta, acuta vel subobtusa, in parte superior hispidula; gluma secunda latior, 3–3.5 mm longa; lemma sterile 3.5–4 mm longum, obtusum, apice hispidulum; flosculi primi lemma 4–4.5 mm longum, lemma sterile simulans; palea lemma 1 mm superans, apice angusta, hispidula, carinis plus minusve scabris vel ciliatis.

Culms as much as 4 m high, with two or three flowering branches at the summit, these 100–110 cm long; exposed portion of the sheaths about 1–2 cm long, or the upper somewhat elongate, glabrous, the rim relatively thin, about 0.5 mm long, glabrous or minutely ciliate, the throat somewhat rounded, fimbriate; blades 15–20 cm long, 2.7–4.7 cm wide or the uppermost smaller, acuminate, gradually rounded to the base, this about 4 mm wide, scarcely petiolate, much narrower than the mouth of the sheath, glabrous on both surfaces, the margins more or less scabrous; inflorescence 30–38 cm long, 5–6 cm wide, the numerous branches stiffly spreading, at least the lower ones with short divergent branchlets in the lower half, the main axis and branches hirsute; spikelets with 1 or 2 fertile florets and a rudiment, the florets distant, the rachilla slender, glabrous, the segment above the sterile lemma 1.5 mm long, the segment above the first fertile floret 2 mm long, the segment above the second fertile floret 2.5 mm long; first glume 2–2.5 mm long, narrow, acute or subobtuse, the tip and the upper part of the midnerve and the margins hispidulous; second glume 3–3.5 mm long, similar to the first but broader; sterile lemma 3.5–4 mm long, obtuse, the tip hispidulous,

the midnerve thickened above, sometimes very shortly excurrent; lemma of first fertile floret 4–4.5 mm long, similar to the sterile lemma; palea about 1 mm longer than the lemma, the narrow tip hispidulous, the keels more or less scabrous or ciliate.

TYPE: locally frequent in lower part of lower cumbre, alt. 2100–2200 m, northwest cumbres, Churi-tepuí (Muru-tepuí), Bolívar, Venezuela, January 24, 1953, *John J. Wurdack 34194* (US 2,116,114).

Neurolepis glomerata Swallen, sp. nov.

Panicula 80 cm longa, anguste pyramidata, basi 20 cm lata, ramis crassis patentibus vel adscendentibus, inferioribus ramulis brevibus, patentibus, densifloris; spiculae glomeratae, 5.5–6.3 mm longae, brevissime pedicellatae; glumae latae, acuate vel obtusae, prima, 1.3–1.6 mm longa, secunda 2–2.3 mm longa; lammata sterilia obtusa, minute ciliata, primum ca. 2.6 mm longum, secundum 3.6–4 mm longum; lemma fertile acutum vel mucronatum, acre.

Panicle more than 80 cm long, narrowly pyramidal, at least 20 cm wide at the base, the coarse branches spreading or widely ascending with a very large pulvinus at the base, the lower branches with short, spreading, very densely flowered, somewhat distant branchlets, the very short secondary branchlets subtended by glume-like bracts; spikelets 5.5–6.3 mm long, very short-pedicellate; glumes broad, acute or obtuse, the first 1.3–1.6 mm long, the second 2–2.3 mm long; sterile lemmas obtuse, the tip minutely ciliate, the first about 2.6 mm long, the second 3.6–4 mm long; fertile lemma acute or mucronate, sharp-pointed; palea about as long as the lemma, blunt, not keeled.

TYPE: common type; inflorescence often leafless, straight; stem 20–25 feet tall; *Bonnetia* forest, northwestern part of summit of Abácapa-tepuí, alt. 2125–2300 m, Chimantá Massif, Bolívar, Venezuela, April 13, 1953, *Julian A. Steyermark 74925* (in part; US 2,182,879). *Steyermark 74925* is a mixture; the inflorescence is *Neurolepis* but the vegetative sheets are *Myriocladus*. *Steyermark 74926* is entirely *Neurolepis*, but all the spikelets have fallen from the panicle. It is obviously, however, the same as described above. The vegetative parts are as follows:

Base hard, woody, about 8 mm thick, about 50 cm long, consisting of about 12 shortened internodes, the leaves fallen, with occasional prop roots; sheaths smooth and shining, the back much thickened toward the summit, somewhat auriculate, the auricles fimbriate; ligule about 8 mm long, the membrane behind it about 2 cm long; blades deciduous, 1.5 m long or probably longer, 4–5 cm wide, more or less scabrous on the margins, attenuate-pointed, attenuate toward the base to a hard, sulcate petiole about 10 cm long.

Neurolepis densiflora Swallen, sp. nov.

Culmi usque ad 9 m alti; vaginae ca. 30 cm longae, subauriculatae, in ore fimbriatae; panicula 85 cm longa, ca. 12 cm lata, attenuata, ramis rigide adscendentibus, basi nudis, ramulis brevibus appressis; spiculae 6–6.5 mm longae, brevissime pedicellatae, appressae; glumae et lemmata sterilia acuta vel subobtusa, interdum apiculata; gluma prima 1–1.2 mm longa; gluma secunda 1.5–2 mm longa; lemma sterile primum 2.4–3 mm longum; lemma sterile secundum 3.5–3.8 mm longum; lemma fertile mucronatum, mucrone 0.5–0.8 mm longo.

Vegetative specimen consists of a fascicle of lower sheaths (blades fallen) and a portion of the culm above it; culm 1 cm thick with relatively thin walls; sheaths about 30 cm long, the back thick and hard, the margins very thin, scarcely auriculate, fimbriate in the throat; panicle 85 cm long, about 12 cm wide at the widest part, tapering, the relatively coarse branches stiffly ascending or the upper ones spreading, densely flowered, naked for a short distance at the base, with short appressed branchlets; spikelets 6-6.5 mm long, very short-pedicellate, appressed; glumes and sterile lemmas acute or subobtuse, sometimes apiculate; first glume 1-1.2 mm long; second glume 1.5-2 mm long; first sterile lemma 2.4-3 mm long; second sterile lemma 3.5-3.8 mm long; fertile lemma mucronate, the point 0.5-0.8 mm long; palea as long as the body of the lemma, not keeled.

TYPE: common in openings, flowering culms up to 30 feet high, lower mixed *Bonnetia* forest above southeast-facing upper shoulder on slope leading to summit of Apácara-tepuí, alt. 2000-2150 m, Chimantá Massif, Bolívar, Venezuela, June 20, 1953, *Julian A. Steyermark 75806* (US 2,182,907, 2,182,910).

This species is closely related to *N. angusta,* differing in having smaller spikelets, branches naked at the base, and more open panicles, the axis densely hirsute.

Neurolepis nigra Swallen, sp. nov.

Culmi erecti usque ad 10 m alti foliis ad basin confertis; vaginae plus minusve auriculatae efimbriatae, inferiores ca. 20 cm longae marginibus tenuibus, culmorum vaginae elongatae solutae; ligula 5-10 mm longa; laminae 85-100 cm longae, 4 cm latae, acuminatae, marginibus scabrae, inferiores ad basin attenuatae petiolo ca. 10 cm longo, deciduae, culmorum laminae ad basin attenuatae, epetiolatae, persistentes; panicula ca. 1 m longa, 4 cm lata, densa, interrupta, ramis densifloris adscendentibus vel patentibus, usque ad 3 cm longis; spiculae 5-6 mm longae, brevipedicellatae; glumae et lemmata sterilia obtusa summo minute pubescentia; gluma prima 1.1-1.3 mm longa; gluma secunda 1.8-2 mm longa; lemma sterile primum 2.2-2.8 mm longum; lemma sterile secundum 3.2-4 mm longum; lemma fertile 4.8-5.8 mm longum, acutum, glabrum, nigrum, laeve, lucidum.

Coarse perennial, the leaves densely crowded at the base in a fan-shaped cluster, the upper part of the culm naked; culms erect, as much as 10 m high, hollow with thin walls; sheaths somewhat auriculate, not fimbriate, the basal ones about 20 cm long, much thickened and rounded on the back with thin margins, the upper culm sheaths elongate, loose, scarcely thickened; ligule 5-10 mm long, with a fibrous membrane behind it and extending beyond it; blades 85 cm to more than 1 m long, about 4 cm wide, acuminate, the margins scabrous, the lower ones deciduous, attenuate to a thick, hard petiole-like base about 10 cm long, sulcate above, the upper ones attenuate but without a petiole-like base, apparently persistent; panicle about 1 m long, 4 cm wide, dense, attenuate, interrupted below, the very densely flowered branches ascending to spreading, not more than 3 cm long, usually less; spikelets 5-6 (mostly 6) mm long, short-pedicellate; glumes and sterile lemmas obtuse, minutely pubescent at the summit; first glume 1.1-1.3 mm long; second glume 1.8-2 mm long; first sterile lemma 2.2-2.8 mm long; second sterile lemma 3.2-4 mm long; fertile lemma 4.8-5.8 mm long, acute, glabrous, black, smooth and shining; palea a little shorter than the lemma, subobtuse, not keeled, apparently 3-nerved.

TYPE: locally frequent, open forested laterite slopes along tributary of east branch of headwaters of Río Tirica, alt. 2185-2210 m, Chimantá Massif, Central Section, Bolívar, Venezuela, February 13, 1955, *Julian A. Steyermark & John J. Wurdack 860* (US 2,182,130, 2,182,131, 2,182,132).

Panicum tiricaense Swallen, sp. nov.

Perenne; culmi erecti, 20-35 cm alti, papiloso-pilosi vel glabri, nodis barbatis,

ad nodos intermedios ramosi; vaginae internodia aequantes, pilosae vel papilloso-pilosae in collo pubescentes marginibus ciliatae; ligula ciliata 2 mm longa; laminae 4–6.5 cm longae, 5–9 mm latae, acutae, subcordatae, dense pilosae; paniculae 3–7 cm longae, 1.5–3.5 cm latae, ramis solitariis adscendentibus vel patentibus axe pilosae; spiculae 2–2.2 mm longae, purpureae, sparse pubescentes vel pilosae; gluma prima 1.5–1.6 mm longa, acuta, 1-nervia; gluma secunda et lemma sterile tenuia fructu paulo longiora, gluma obtusa, lemma subobtusum; fructus 1.8 mm longus, ellipticus, subacutus, striatus, glabrus, lucidus.

Perennial; culms erect, 20–35 cm high, branching at the middle nodes, papillose-pilose to glabrous, the nodes bearded; sheaths mostly about as long as the internodes, pilose or papillose-pilose, pubescent on the collar, the margins ciliate; ligule a rim of hairs about 2 mm long; blades 4–6.5 cm long, 5–9 mm wide, acute, rounded and somewhat cordate at the base, softly and rather densely pilose on the lower surface, sparsely pilose above but the hairs longer, somewhat ciliate at the base; panicles 3–7 cm long, 1.5–3.5 cm wide, the solitary branches stiffly ascending to spreading, branching at or near the base, the axis and branches pilose; spikelets 2–2.2 mm long, tinged with purple, sparsely pubescent or pilose; first glume 1.5–1.6 mm long, 1-nerved, usually acute; second glume and sterile lemma thin, slightly longer than the fruit, the glume obtuse, the lemma subobtuse with a palea but apparently without a staminate flower; fruit 1.8 mm long, elliptic, blunt, striate, smooth and shining.

TYPE: locally frequent at base of Upper Falls of Río Tirica above Summit Camp, alt. 1940–1950 m, Central Section, Chimantá Massif, Bolívar, Venezuela, February 7, 1955, *Julian A. Steyermark & John J. Wurdack 535* (US 2,182,126).

This species is closely allied to *Panicum albociliatum* Swallen, which differs in having larger, glabrous spikelets, and shorter, ovate, glabrous, ciliate blades.

Panicum tiricaoides Swallen, sp. nov.

Perenne; culmi erecti vel adscendentes basi decumbentes, ramosi, ca. 80 cm longi nodiis pubescentibus; vaginae sparse pilosae vel papilloso-pilosae in collo dense pubescentes; ligula ciliata, 2–3 mm longa; laminae usque ad 8 cm longae, 10 mm latae, in ramis multo breviores, subtus dense pubescentes, supra sparse pilosae vel subglabrae; paniculae 8 cm longae, 6 cm latae, ramorum parviores; spiculae 2.4–2.5 mm longae, acutae, glabrae; gluma prima 1.5–1.7 mm longa, acuta, 3-nerviis; gluma secunda et lemma sterile aequalia fructum aequantia; fructus 2.3 mm longus, summo compressus scabrus.

Perennial; culms erect or ascending from a decumbent base, about 80 cm long, branching, the nodes pubescent or nearly glabrous; sheaths sparsely pilose or papillose-pilose, densely pubescent on the collar; ligule a short ciliate membrane 2–3 mm long; blades as much as 8 cm long, 10 mm wide, much smaller on the branches, softly and densely pubescent on the lower surface, sparsely pilose or nearly glabrous above; panicle 8 cm long, 6 cm wide, smaller on the branches; spikelets 2.4–2.5 mm long, acute, glabrous; first glume 1.5–1.7 mm long, acute, 3-nerved; second glume and sterile lemma equal, about as long as the fruit; fruit 2.3 mm long, scabrous at the summit, the tip laterally compressed.

TYPE: frequent, thickets along Río Tirica, below Summit Camp, alt. 1925 m, Central Section, Chimantá Massif, Bolívar, Venezuela, February 5, 1955, *Julian A. Steyermark & John J. Wurdack 475* (US 2,182,124).

Panicum wurdackii Swallen, sp. nov.

Perenne; culmi erecti basi decumbentes 110 cm alti, glabri; folia inferiora conferta laminis 8–12 mm latis curvatis; culmorum vaginae elongatae internodiis multo breviores; laminae erectae, 25–30 cm longae, 7–8 mm latae, superiores

breviores, supra ad basin dense pilosae marginibus scabrissimae; panicula pyramidata, 14 cm longa, 12 mm lata, ramis adscendentibus ramulis divergentibus, superne paucifloris; spiculae 3.2–3.4 mm longae; gluma prima lata, acuta, spicula ca. ½ brevior carina scabra; gluma secunda et lemma sterile aequalia fructum superantia, glabra vel ad summum scabra; fructus 2.6–2.7 mm longus, laevis, flavidus.

Perennial; culms stiffly erect from a decumbent, rhizome-like base, 110 cm high, glabrous; basal leaves crowded, the blades 8–12 mm wide, becoming loosely curled; sheaths of the culm leaves elongate but much shorter than the internodes; ligule wanting; blades very firm, erect, gray-green. 25–30 cm long, 7–8 mm wide, the upper smaller, densely pilose on the upper surface toward the base, the margins very scabrous; panicle pyramidal, 14 cm long, about 12 mm wide, the branches stiffly ascending, the divergent branchlets bearing a few spikelets above the middle; spikelets 3.2–3.4 mm long; first glume broad, acute, a little more than half as long as the spikelet, the midnerve prominent, scabrous; second glume and sterile lemma equal, pointed beyond the fruit, glabrous, or scabrous on the midnerve toward the summit; fruit 2.6–2.7 mm long, smooth, straw-colored.

TYPE: locally frequent, scrub forest near Summit Camp, Central Section, Chimantá Massif, alt. 1925 m, Bolívar, Venezuela, February 2, 1955 *Julian A. Steyermark & John J. Wurdack 351* (US 2,182,119).

Panicum steyermarkii Swallen, sp. nov.

Perenne; culmi erecti basi decumbentes, ca. 60 cm alti; folia ad basin conferta; vaginae solutae, glabrae, basi sparse pilosae; laminae erectae, subattenuatae, planae, 20–25 cm longae, 5 mm latae, glabrae; culmorum folia 2, elaminata, supremum basin paniculae attingens; paniculae 7–8 cm longae ramis paucis adscendentibus inferioribus usque ad 5 cm longis; spiculae 3.6–4.0 mm longae pedicellis appressis, lateralibus spicula multo brevioribus; gluma prima acuta, spicula ca. ½ brevior; gluma secunda et lemma sterile fructu longiora, gluma lemmate sterili paulo brevior; fructus acuminatus, 3 mm longus.

Perennial; culms erect from a somewhat decumbent base, about 60 cm high; leaves mostly crowded toward the base, the sheaths loose, glabrous except for a few hairs at the base, the blades erect, subattenuate, flat or becoming loosely rolled, about 20–25 cm long, about 5 mm wide, entirely glabrous; culm leaves 2, the uppermost sheath reaching the base of the panicle, bladeless; panicles 7–8 cm long, the few branches stiffly ascending, the lower ones as much as 5 cm long; spikelets 3.6–4.0 mm long, glabrous, the pedicels appressed, rather stout, the lateral ones usually much shorter than the spikelet; first glume acute, a little more than half as long as the spikelet; second glume and sterile lemma pointed beyond the fruit, the glume a little shorter than the lemma; fruit acuminate, 3 mm long.

TYPE: frequent along banks of Caño Mojado, east of north escarpment, below upper falls of Caño Mojado, alt. 1895–1910 m, Torono-tepuí, Chimantá Massif, Bolívar, Venezuela, February 20, 1955, *Julian A. Steyermark & John J. Wurdack 954* (US 2,182,133). Also collected along river banks in a scrub forest near Sum-

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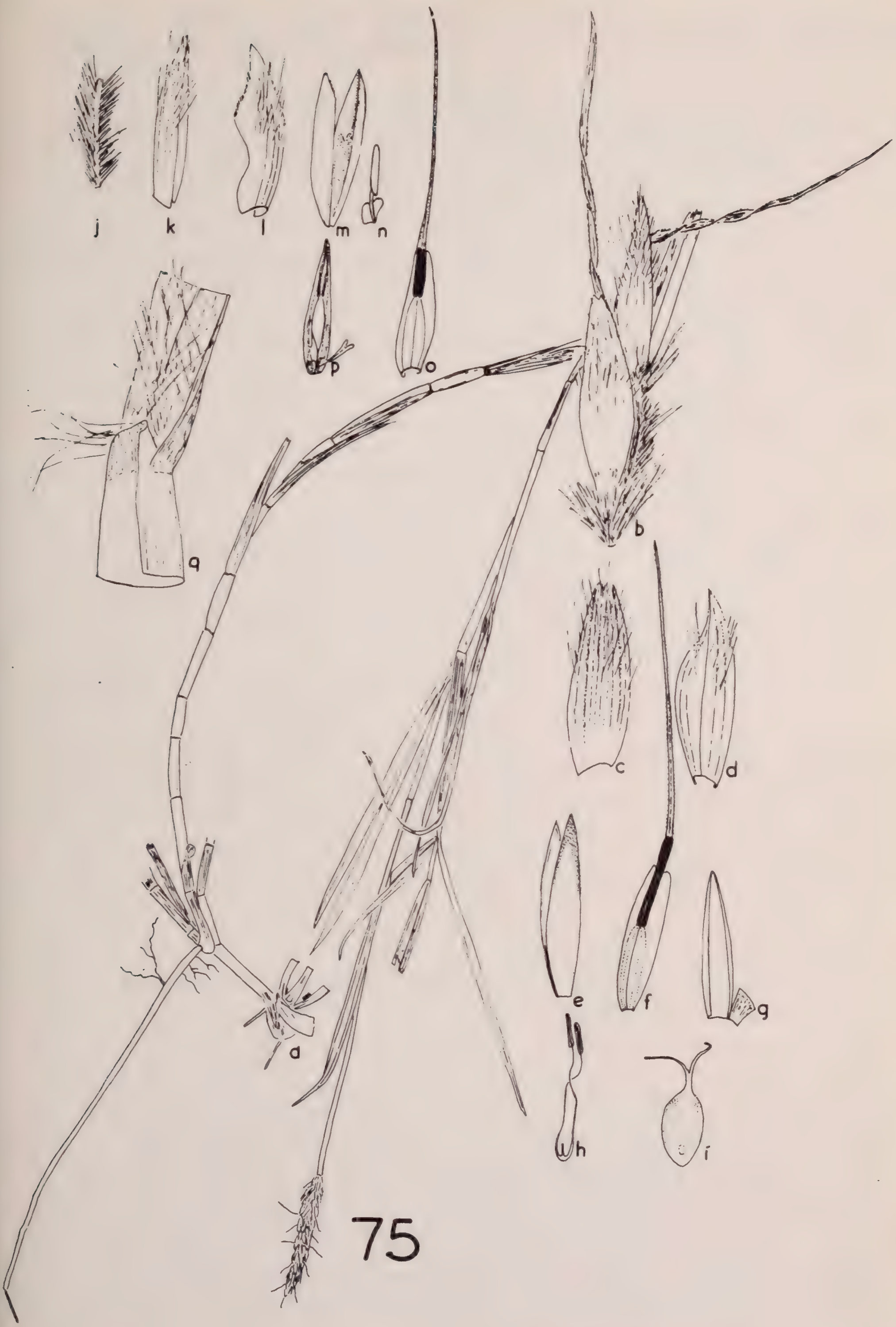
Explanation of figure 75

FIG. 75. *Ischaemum arenosum* Sohns. *a*, plant; *b*, pair of spikelets; *c*, first glume; *d*, second glume; *e*, lemma and palea of lower floret; *f*, fertile lemma; *g*, palea and one lodicule; *h*, stamens (only two shown); *i*, caryopsis; *j*, pedicel; *k*, first glume; *l*, second glume; *m*, lemma and palea of lower floret; *n*, stamen and lodicule; *o*, fertile lemma; *p*, palea and essential organs; *q*, ligule, sheath, and blade. *j-p* from the pedicellate spikelet. *a* × ½; *b-p*, × 8; *q*, × 5 (type).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mit Camp, February 2, 1955, *Julian A. Steyermark & John J. Wurdack 327*. The spikelets of the latter specimen average somewhat smaller than those of the type.

Ischaemum arenosum Sohns, sp. nov. (Fig. 75.)

Perenne; culmi erecti, usque ad 60 cm alti; vaginae internodiis longiores, glabrae; ligula 1.5 mm longa, membranacea; laminae 2–10 cm longae usque ad 7 mm latae, planae, prope basin longe pilosae, ceteroqui glabrae; racemi solitarii, 5 cm longi (vel longiores), erecti, pilosi; articuli ca. 4.5 mm longi, triquetri, marginibus pilosi; spiculae sessiles 4.5 mm longae; gluma inferior 3.5–4.5 mm longa, 9-nervia, dorso pilosa, apice bidentata; gluma superior 3.5–4.5 mm longa, 3-nervia, carinata, dorso prope summitatem pilosa, ceteroqui glabra; lemma sterile ca. 3.5 mm. longum, membranaceum, 3-nervium; palea lemma sterile subaequans, bicarinata, carina superne valide scaberrima; stamina 3; antherae breves; ovarium nullum; lodiculae 2, 0.4–0.6 mm longae; lemma fertile ca. 3 mm. longum, 3 (–5)-nervium, membranaceum; arista 3.5–6 cm longa, laxe torta; palea lemma fertile aequans, bicarinata, membranacea; stamina 3; antherae 0.8–1 mm longae; lodiculae 2, 0.4–0.5 mm longae; spiculae pedicellatae 3.4–5.5 mm longae, breviter articulatae; gluma inferior 3.4–5.5 mm longa, carinata, 9-nervia, dorso leviter pilosa; gluma superior primam aequans, 3 (–5)-nervis, carinata, dorso prope summitatem leviter pilosa; lemma sterile 3–4 mm longum, membranaceum, 1 (–3)-nervium, glabrum; palea lemma sterile aequans vel longior, valde bicarinata, carinis scaberrimis; stamina 3; antherae 0.9–1 mm longae; ovarium nullum; lodiculae 2, 0.3–0.5 mm longae; lemma fertile 2.5–3 mm longum, 3-nervium, membranaceum; arista 4–5.5 mm longa, laxe torta; palea 2.1–3 mm longa, membranacea; stamina 3; lodiculae 2, ca. 0.8 mm longae, truncatae.

Perennial; semidecumbent at the base and rooting at the nodes, culms then erect to 60 cm tall, many-noded, sometimes the upper nodes of young culms pubescent; sheaths longer than the internodes, glabrous; ligule 1.5 mm long, membranous; blades 2–10 cm long, up to 7 mm wide, flat, papillose-pilose at the base behind the ligule, otherwise glabrous, the nerves white and prominent on the upper surface; racemes solitary, 5 cm or more long, erect, pilose; rachis joints about 4.5 mm long, 3-angled, ascending-pilose on the angles; sessile spikelet up to 4.8 mm long, shortly pedicellate; first glume 3.5–4.5 mm long, 9-nerved, pilose over the back and on the margins, the tip slightly bidentate; second glume as long as the first, 3 (–5)-nerved, keeled, pilose on the back toward the tip, otherwise glabrous; lower floret 3–3.5 mm long; sterile lemma about 3.5 mm long, thin, faintly 3 (–5)-nerved; palea as long as or longer than the lemma, firmer in texture, 2-keeled, the keels strongly scaberulous toward the tip; stamens 3, the anthers small and apparently non-functional; pistil none; lodicules 2, 0.4–0.6 mm long; fertile lemma about 3–3.4 mm long, 3 (–5)-nerved, the nerves converging into the base of the awn, the awn 3.5–6 mm long, loosely twisted, its base dark-brown, the median nerve prominent, the terminal portion antrorsely scabrous; palea as long as the lemma, 2-keeled, membranous; stamens 3, the anthers 0.8–1 mm long; ovary developed, stigmas plumose, the styles free to the top of the ovary; lodicules 2, 0.4–0.5 mm long; pedicellate spikelet 3.4–5.5 mm long, the joint 0.5–0.8 mm long, densely short-pilose; first glume 3.4–5.5 mm long, keeled, 9-nerved, sparingly pilose over the back; second glume as long as the first, 3 (–5)-nerved, keeled, sparingly pilose over the back toward the tip; sterile lemma 3–4 mm long, membranaceous, 1 (–3)-nerved, glabrous; palea as long as or 0.1–0.5 mm longer than the lemma, firmer, 2-keeled, scaberulous on the keels; stamens 3, the anthers 0.9–1 mm long; ovary 0; lodicules 2, 0.3–0.5 mm long; fertile lemma 2.5–3 mm long, 3-nerved, the nerves converging into the base of the awn, membranaceous;

awn 4.0–5.5 mm long, loosely twisted, its base dark brown; palea as long as the lemma, membranaceous, 2-keeled; stamens 3; ovary developed; lodicules 2, about 0.8 mm long, truncate.

TYPE: locally frequent in moist sand along river, along Río Tirica (Río Aparurén) just above Techiné-merú, alt. 470 m, Chimantá Massif, Estado Bolívar, Venezuela, January 16, 1955, *Julian A. Steyermark & John J. Wurdack 122* (US 2,182,116).

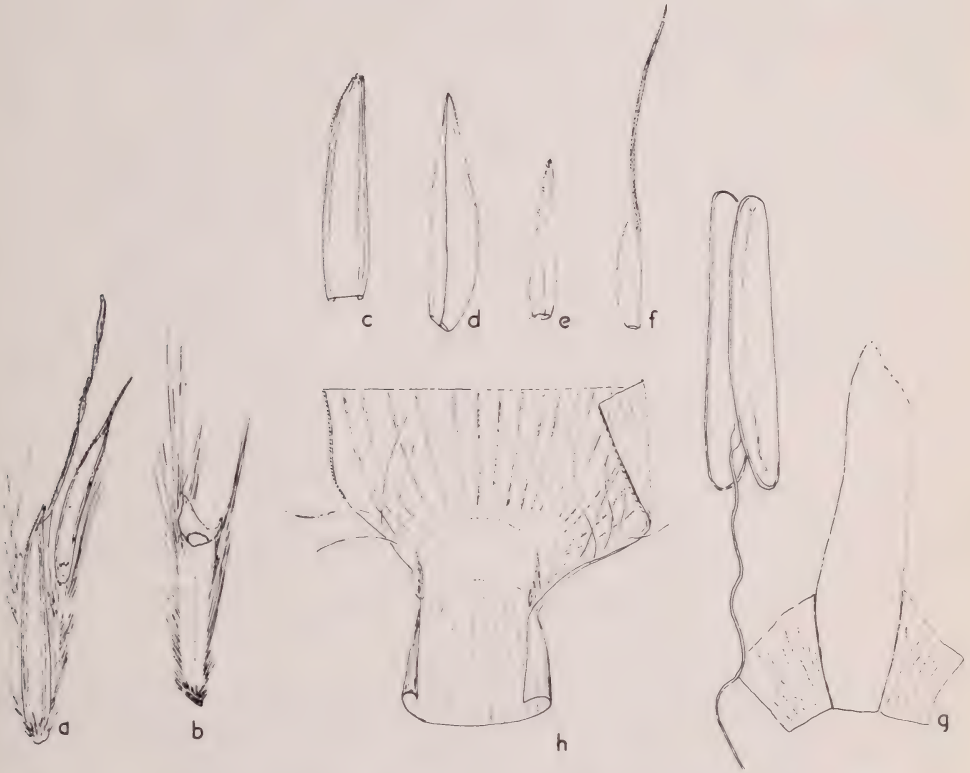

FIG. 76. *Andropogon crassus* Sohns. *a*, pair of spikelets; *b*, rachis-joints; *c*, first glume; *d*, second glume; *e*, sterile lemma; *f*, fertile lemma; *g*, stamen, lodicules, and palea; *h*, ligule, sheath, and blade. *a-f*, *h*, × 8; *g*, × 20 (type).

Andropogon crassus Sohns, sp. nov. (Fig. 76.)

Perennis; culmi erecti, graciles, 1 m alti vel altiores; vaginae glabrae, inferiores internodiis breviores; ligula 1.5 mm longa; laminae lanceolato-lineares, 45 cm longae, usque ad 2 cm latae, omnes glabrae vel supra basin versus longe pilosae, marginibus scaberrimae; inflorescentia multispatha, racemis 1–4 cm longis, gracillimis, articulis 3 mm longis, marginibus dense pilosis, ceteroqui glabris; spiculae sessiles ca. 4 mm longae; gluma inferior 4-nervia, dorso leviter sulcata, marginibus apiceque scaberrimae; gluma superior 3-nervia, valde carinata, scabra; lemma sterile 2.8–4 mm longum, 3-nervium, marginibus leviter ciliolatis; palea lemmate subduplo brevior, enervia; lemma fertile 2–3.2 mm longum, bifidum; arista laxe torta, 5–8 mm longa, scaberrima; palea 2–2.5 mm longa, membranacea, enervia; lodiculae 2, 0.5–0.7 mm longae; stamina 3; antherae 1.5–1.8 mm longae; spiculae pedicellatae 3–4 mm longae; anthoecia nulla.

Perennial; erect, one or more m tall, the nodes glabrous; sheaths glabrous, the lower shorter than the internodes, the upper longer; ligule a membranous rim, 1.5 mm long; blades long-attenuate, up to 45 cm long, to 2 cm wide, glabrous on both surfaces, sparingly long-pilose on the upper surface at the base back of the ligule, the margins antrorsely scabrous; inflorescence of numerous spatheate racemes, a single raceme terminating each peduncle; racemes 1–4 cm long, mostly enclosed by the spathes; rachis-joints mostly 3 (3.2) mm long, densely pilose on the margins, the ad- and abaxial faces glabrous; spikelets 2 at each node of the raceme, one sessile, the other pedicellate; sessile spikelet about 4 (to 4.2) mm long; first glume 4-nerved (2 additional indistinct lateral nerves sometimes present), dorsally flattened, slightly sulcate, the margins inflexed, firmly clasping the second glume, the margins and tip scaberulous; second glume slightly shorter than the first, 3-nerved, strongly keeled, the keel antrorsely scabrous, sometimes slightly awn-tipped; sterile lemma 2.8–4 mm long, 3-nerved (sometimes 2 additional lateral nerves present), the median nerve developed, the margins shortly ciliolate; palea sometimes present as a thin, membranous scale, about half as long as the sterile lemma; fertile lemma 2–3.2 mm long, bifid at the apex, awned from between the lobes; awn loosely twisted, 5–8 mm long, antrorsely scabrous; palea membranaceous, 2–2.5 mm long; lodicules 2, 0.5–0.7 mm long, fused at the base to the lemma and palea; stamens 3, the anthers 1.5–1.8 mm long (in some florets the anthers appear flat, empty, and without evidence of pollen formation); ovary developed; pedicel of the pedicellate spikelet slightly shorter than the rachis-joint, densely pilose on the margins; pedicellate spikelet 3–4 mm long, reduced to the glumes; first glume 5-nerved, the median nerve developed.

TYPE: along base of southeast-facing sandstone bluffs of Chimantá-tepuí (Torono-tepuí), from south corner northeastward, alt. 1700 m, Chimantá Massif, Estado Bolívar, Venezuela, May 21, 1953, *Julian A. Steyermark 75515* (US 2,182,901).

A striking species of *Andropogon* with long-attenuate blades.

Andropogon diuturnus Sohns, sp. nov. (Fig. 77.)

Perennis, dense caespitosus; culmi erecti, 20–65 cm alti, multinodes; vaginae glabrae, superiores internodiis breviores; laminarum superiorum saepissime obsoletae; ligula 1.5–1.7 mm longa, membranacea, apice ciliolata; laminae usque ad 15 cm longae, usque ad 5 mm latae, omnes glabrae vel leviter scaberrimae, prope basin saepius pilosae, subtus costa media alba; racemi solitarii, interdum bini, plerumque 4–5 cm longi, recti vel leviter flexuosi, dense albo-pilosi; articuli dense longeque pilosi; spiculae sessiles 4.1–6 mm longae (plerumque 5.2 mm); gluma inferior plana, longitudine sulcata, glabra, summitatem versus scabra, saepe bidentata; gluma superior primam aequans, valde carinata, 3-nervia, apice scaberrima; lemma sterile 0.9–1.5 mm longum, membranaceum, marginibus ciliolatum; lemma fertile membranaceum, 3-nervium, apice bifidum; arista 7.5–14 mm longa, scabra; palea 1–2 mm longa, enervia, saepe fissa; lodiculae 2, 0.5–0.7 mm longae, truncatae; stamina 3; antherae 1–1.5 mm longae; pedicellus spiculam sessilem subaequans, marginibus dense longeque pilosus; spiculae pedicellatae 1.1–4.3 mm longae; anthoecia nulla.

Perennial, densely tufted; culms erect, 20–65 cm tall; nodes several, the lower internodes short; sheaths glabrous, longer than the lower internodes, shorter than the upper; ligule a membranous rim, the tip ciliolate, 1.5–1.7 mm long, the margins of the sheath auriculate; blades mostly evenly distributed along the culm, progressively shorter upward, 0.1–15 cm long, 0.5–5 mm wide, glabrous or slightly scaberulous on both surfaces, occasionally with a few hairs,

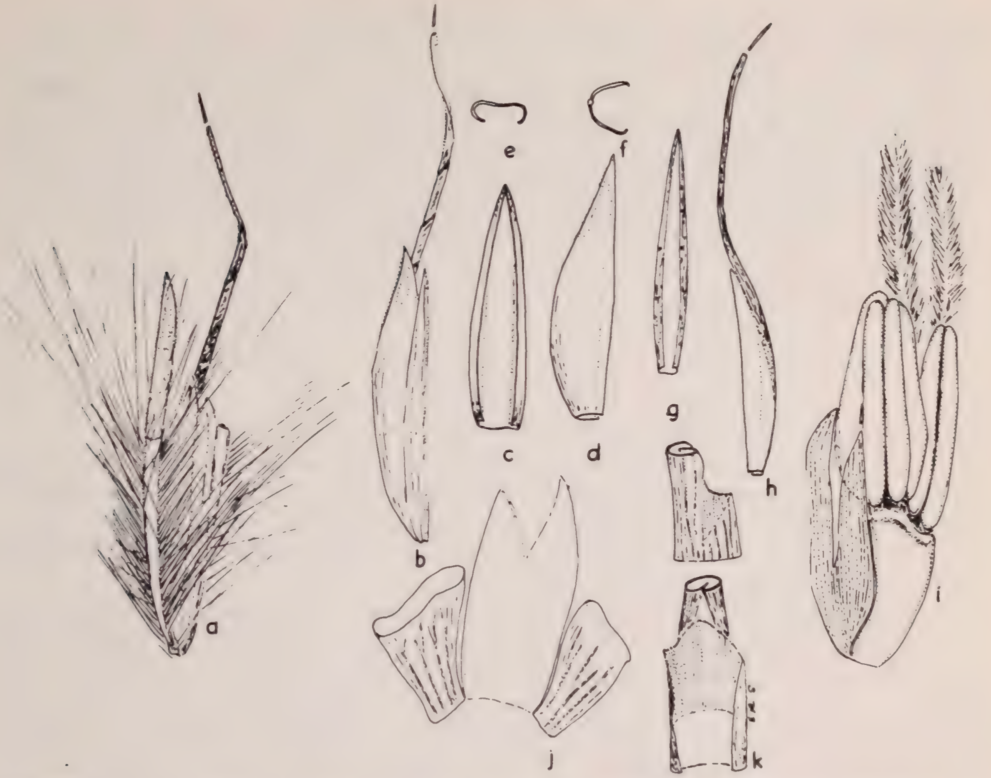

FIG. 77. *Andropogon diuturnus* Sohns. *a,* pair of spikelets; *b,* sessile spikelet; *c,* first glume; *d,* second glume, *e,* cross section of first glume; *f,* cross section of second glume; *g,* sterile lemma; *h,* fertile lemma; *i,* palea, lodicules, and essential organs; *j,* palea and lodicules; *k,* two views of the ligule. *a-h,* × 8; *i-j,* × 20 (type).

8–10 mm long, behind the ligule on the basal blades, flat when green, drying convolute, the midrib white and very prominent on the lower surface of mature blades; racemes mostly one per peduncle, occasionally 2, mostly 4–5 cm long, straight or slightly curved (not flexuous), densely white-hairy; rachis-joints densely long-pilose from base to apex; sessile spikelet 4.1–6 mm long (excluding the awn), their average length 5.2 mm (for 18 spikelets); first glume flat, sulcate, glabrous, the tip slightly scabrous, often slightly bidentate; second glume as long as the first, strongly-keeled, 3-nerved, the tip slightly scaberulous; sterile lemma 0.9–1.5 mm long, thin, transparent, appearing 2-keeled, the margins finely ciliolate; fertile lemma thin, transparent, 3-nerved, bifid at the apex, awned from between the lobes, the awn 7.5–14 mm long (measured from the tip of the first glume), the column flat, twisted 3 or 4 times, brown, terminal portion pale, antrorsely scabrous; palea a nerveless scale 1–2 mm long, often splitting at the tip; lodicules 2, 0.5–0.7 mm long, truncate, thickened at the top; stamens 3, the anthers yellow, 1–1.5 mm long; pistil well developed, the stigmas laterally exserted; pedicel about 1 mm shorter than the sessile spikelet, flattened, densely long-pilose on the margins from base to apex; sterile spikelet 1.1–4.3 mm long (their average length 3 mm), reduced to the first glume and a rudiment (probably the second glume).

TYPE: locally frequent in small clumps; alt. 1925 m, vicinity of Summit Camp along Río Tirica, Central Section, Chimantá Massif, Estado Bolívar, Venezuela, February 5, 1955, *Julian A. Steyermark & John J. Wurdack 492* (US 2,182,125).

VENEZUELA: Bolívar: occasional in open places near rock ledges, alt. 1895–1910 m, summit, along Caño Mojado, between base of upper falls and drop to escarpment, Toronotepuí, Chimantá Massif, Estado Bolívar, Venezuela, February 23, 1955, *Steyermark & Wurdack 1066;* infrequent, rocks in Caño Sabana, Savanna Camp, 4500 ft, Cerro Sipapo (Paráque), Terr. Amazonas, Venezuela, December 21, 1948, *Bassett Maguire & Louis Politi 27829;* occasional, rocks in stream bed, Lower Caño Negro, January 1, 1949, *Maguire & Politi 28115;* infrequent, dissected terraces, se slopes Peak IV, elev. 1800 m, Caño Negro Basin, January 3, 1949, *Maguire & Politi 28143;* bunch grass, frequent along stream bed, left branch of Caño Yutaje, elev. 1200 m, Cerro Yutaje, Serranía Yutaje, Río Manapiare, February 25, 1953, *Bassett & Celia K. Maguire 35411.*

This species, mostly with solitary racemes, has a spikelet structure similar to that of *A. macrothrix* Trin., common in Brazil, in which the racemes are two or more.

ERIOCAULACEAE[24]

Paepalanthus apacarensis Moldenke, sp. nov.

Herba pumila subacaulescens; foliis caespitosis patentibus coriaceis obtusis utrinque glabris praeter marginibus ad apicem ciliolatis; pedunculis solitariis brunneis plusminusve parce pilosulis; vaginis adpressis brunneis glabris praeter ore plusminusve piloso; capitulis hemisphaericis albidis; bracteolis involucri nigris ovatis acutis adpresso-pilosis ciliatis.

Dwarf herb; stems much abbreviated or obsolete; leaves cespitose, spreading, coriaceous, bright-green when young, brunnescent in age, 4–7 mm long, about 1 mm wide at the middle, obtuse at the apex, glabrous on both surfaces except for the more or less ciliolate margins near and at the apex, not fenestrate nor striate; peduncle solitary, erect, brown, 5–6.5 cm long, more or less sparsely pilosulous with rather spreading hairs, several-costate; sheath appressed, about 1 cm long, brownish, glabrous except for the more or less pilose mouth, the blade erect, about 2 mm long, appressed, acute at the apex, somewhat ciliolate-margined; heads hemispheric, whitish, about 7 mm wide; involucral bractlets rather firm, black, ovate, about 2.5 mm long and 1.2 mm wide, acute at the apex, appressed-pilose on the back, ciliate-margined; flowers subsessile; staminate florets: sepals 3, separate, oblanceolate, brownish toward the apex, about 2 mm long and 0.7 mm wide, more or less navicular and concave, acute at the apex, slightly falcate, densely white-barbate on the back near and at the apex; petals 3, united into a slender tube about 2.2 mm long, stramineous, the free portions minute; stamens 3, exserted; filaments filiform; anthers pale yellow or white; pistil-rudiment included; pistillate florets: sepals 3, separate, narrow-elliptic, navicular, concave, about 2 mm long and 0.7 mm wide, blackish or brownish, subacute at the apex, densely white-barbate at the apex; petals 3, separate, brownish, oblong, flat, about 2 mm long and 0.5 mm wide, subacute or obtuse at the apex, thin-textured, long-pilose from base to apex, very sparsely barbellate at the apex; style rather stout, stramineous, about 1.2 mm long, glabrous, its 3 appendages borne at the same level and alternate with the stigmas, about 0.5 mm long; stigmas 3, about 0.5 mm long; ovary subglobose, stramineous, about 0.5 mm long, 3-sulcate, 3-celled.

TYPE: *Julian A. Steyermark 75864,* moist ledges of rock around talus of large high rock on the east-central portion of the summit of Apácara-tepuí, altitude 2450–2500 m, Chimantá Massif, Bolívar, Venezuela, on June 21 or 22, 1953 (Herb. H. N. Moldenke).

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[24] By H. N. Moldenke.

Paepalanthus cumbricola Moldenke, sp. nov.

Herba perennis; caulibus elongatis brachiatis densissime foliosis adscendentibus vel erectis; ramis brevibus dense foliosis; foliis subcoriaceis acutis supra dense longeque pilosis, dein glabrescentibus nitidisque, subtus parce pilosis vel glabris; pedunculis obscure 4-costatis dense albido-pilosis, pilis antrorsis adpressis sericeis; vaginis arcte adpressis parce pilosis multistriatis, laminis ovatis acuminatis paullo patentibus, marginibus interioribus plusminusve longe ciliatis, ad apicem breviter ciliatis; capitulis hemisphaericis griseis; bracteolis involucri atro-brunneis ovatis argute attenuato-acutis ciliatis densiuscule apicem versus pilosis.

Perennial herb; stems elongate to 17 cm, several-branched, very densely leafy ascending or erect; branches short, densely leafy; leaves subcoriaceous, firm, bright green on both surfaces when young, darker or brunnescent in age, 1.5-3 cm long, 3-4 mm wide at the middle, to 5 mm wide at the base, gradually attenuate from the base to the acute apex, entire, densely long-pilose above with white hairs when young, glabrescent and shiny in age, scattered-pilose or glabrous beneath, the venation practically indiscernible; peduncles about 5 per branch, borne at its apex, erect, 13.5-15 cm long, rather obscurely 4-costate, densely whitish-pilose with antrorse, appressed silky hairs, more irregularly so in age; sheath 2.5-4 cm long, closely appressed, scattered-pilose, many-striate, the blade ovate, about 4 mm long, acuminate, somewhat spreading, more or less long-ciliate on the lower margins and short-ciliate toward the apex; heads hemispheric, 8-10 mm wide, grayish; involucral bractlets firm, dark-brown, ovate, about 2.5 mm long and 1.5 mm wide, sharply attenuate-acute at the apex, rather densely pilose toward the apex on the back, ciliate-margined; receptacle pilose; florets sessile; staminate florets: sepals 3, separate, oblanceolate, brownish toward the apex, about 2.5 mm long and 0.75 mm wide, obtuse at the apex, densely white-barbate near and at the apex on the back; petals 3, connate into a stramineous tube about 2.5 mm long, the free portions very short, hyaline, glabrous; stamens 3, exserted; filaments white, flattened, glabrous; anthers pale yellowish; pistil-rudiment short, brown, included in the corolla-tube; pistillate florets: sepals 3, separate, brownish toward the apex, oblong, navicular, concave, about 2.5 mm long and 1.15 mm wide, obtuse or subacute at the apex, densely white-barbate at the apex on the back; petals 3, separate, flat, stramineous or subhyaline, oblong or oblong-spatulate, about 2.7 mm long and 0.75 mm wide, obtuse or subacute at the apex, densely long-pilose, with the basal hairs equaling or surpassing the petals in length; style stout, stramineous, about 1.2 mm long, glabrous, its appendages 3, alternating with and at the same level as the stigmas, about 0.75 mm long; stigmas 3, about 0.75 mm long; ovary oblong, 0.9-1 mm long, glabrous, 3-celled, 3-sulcate.

TYPE: *John J. Wurdack 34308,* upper part of the cumbre, 2300-2350 m alt., northwest cumbres, Churi-tepuí (Muru-tepuí), Bolívar, Venezuela, February 3, 1953 (N Y). The collector notes that the species is locally abundant, in bud and in old fruit, but mostly sterile.

Paepalanthus stegolepoides Moldenke, sp. nov

Herba perennis multiramosa; caulibus crassis dense foliosis; ramis gracilibus densissime foliosis longe pilosis; foliis graminoideis adscendentibus vel patentibus, denique reflexis, acutis chartaceis utrinque glabris; pedunculis erectis 4-costatis paullo contortis brunneis glabris; vaginis brunneis arcte adpressis gracilibus glabris multistriatis paullo contortis, laminis attenuato-acutis; capitulis hemisphaericis albidis vel griseis, ad basin nigris; bracteolis involucri nigris obovato-lingulatis obtusis ad apicem obscure breviterque ciliolatis.

Perennial much-branched herb; stems 5–10 cm long, 1–10 mm thick, densely leafy, with many ascending-spreading branches; branches slender, to 10 cm long, very densely leafy, long-pilose; leaves dark green, intensely blue-green by reflected daylight or with an iridescent purplish-blue sheen when fresh (as in some species of *Stegolepis*), grass-like, ascending or spreading, reflexed in age, 1.5–4 cm long, about 3 mm wide at the middle, acute at the apex, chartaceous, glabrous on both surfaces, conspicuously parallel-veined, the 6 or 7 veins slightly subimpressed above and prominulous beneath; peduncles several or few per branch, terminal, erect, 7–14 cm long, 4-costate, slightly twisted, brown, glabrous; sheath brown, closely appressed to the peduncle, slender, about 2.5 cm long, glabrous, many-striate, slightly twisted, obliquely split at the apex, the blade erect, appressed, 2–3 mm long, attenuate-acute at the apex; heads hemispheric, dull white or gray, 6–9 mm wide, blackish at the base; involucral bractlets black, obovate-lingulate, about 2 mm long and 1.4 mm wide, obtuse or rounded at the apex, rather obscurely short-ciliolate at the apex, otherwise glabrous, shiny; receptacular bractlets oblong, blackish toward the apex, about 2.2 mm long and 0.4 mm wide, subacute or obtuse at the apex, pilose at the apex on the back; staminate florets: sepals 3 (rarely 4), separate, oblanceolate, black toward the apex, about 1.7 mm long and 0.6 mm wide, white-barbate at and near the apex, otherwise glabrous; petals hyaline, connate into a slender tube about 1.2 mm long, glabrous, the free apical portions about 1.2 mm long; stamens 3, exserted; pistillate florets: sepals 3, separate, obovate, black toward the apex, about 2.5 mm long and 1 mm wide, rounded at the apex, white barbate-pilose at the apex on the back; petals 3, separate, subhyaline, oblong-elliptic, about 2 mm long and 0.5 mm wide, obtuse at the apex, densely long-pilose at the base, sparsely pilose at the apex; pistil brown, about 2 mm long, glabrous; style-appendages 3, about 0.7 mm long, inserted at the same level as and alternate with the 3 slender stigmas; ovary oblong, about 0.5 mm long, glabrous, 3-sulcate, 3-celled.

TYPE: *John J. Wurdack 34315,* upper part of the upper cumbre at 2300–2350 m alt., northwest cumbres, Churi-tepuí (Muru-tepuí), Bolívar, Venezuela, February 3, 1953 (NY). This beautiful species is said to be locally frequent in large mats on the dry rocky face of cliffs. It was also collected on the Chimantá Massif by Steyermark and Wurdack (*491, 822*).

Syngonanthus obtusifolius Moldenke, **sp. nov.**

Herba perennis; caulibus valde abbreviatis densissime tomentosis, pilis pallide rubellis; foliis caespitosis coriaceis oblongis obtusis utrinque glabris; pedunculis 1–3, brunneis 5-costatis paullo contortis plusminusve adpresso-pilosis, pilis antrorsis albidis sericeis; vaginis gracilibus firmis adpressis obscure adpresso-pilosulis vel glabrescentibus, laminis elongatis lanceolatis plusminusve adpresso-pilosis acutis; capitulis hemisphaericis; bracteolis involucri firmis griseis anguste lanceolatis attenuatis acutis adpresso-pilosis, pilis antrorsis albido-sericeis; receptaculo longe piloso.

Perennial herb; stems much abbreviated, to about 2 cm long, very densely matted-tomentose with pale pinkish hairs; leaves cespitose, erect, coriaceous, uniformly olive-green and shiny on both surfaces, 5–12 cm long, oblong, rather uniformly 2–5 mm wide from the base to the apex, rounded at the apex, glabrous on both surfaces, very obscurely many-veined but the parallel veins indiscernible above; pendunces 1–3, brown, erect, 28–40 cm long, 5-costate, slightly twisted, more or less appressed-pilose with antrorse, whitish silky hairs; sheath slender, firm, appressed to the peduncle, 8–10 cm long, obscurely appressed-pilosulous or glabrescent, obliquely split at the apex, the blade elongate, lanceolate, 2–3 cm long, more or less appressed-pilose, acute at the apex, erect, sometimes somewhat expanded toward the base; heads hemispheric, 12–15 mm wide; involucral bractlets stiff, grayish-white, tawny at the base, narrow-lanceolate, about 4.2 mm long and 1.2 mm wide, gradually attenuate from the base to the acute apex, appressed-pilose with antrorse whitish-silky hairs; receptacle long-pilose; outer receptacular bractlets firm-textured, lanceolate, blackish especially toward the margins and apex, about 4.2 mm long and 1.5 mm wide, gradually attenuate to the acute apex, appressed-pilose with antrorse hairs on the back, long-ciliate on the margins with antrorsely spreading hairs; inner receptacular bractlets narrow-elliptic, black except at the base, more or less concave, about 4.5 mm long and 1.2 mm wide, attenuate to the acute apex, densely long-pilose on both surfaces with antrorse hairs; staminate florets pedicellate, the pedicel filiform, gray, about 1.5 mm long, long-pilose at the base; sepals 3, separate, oblanceolate, black on the upper half, navicular-concave, about 2.5 mm long and 0.7 mm wide, very densely long-barbate at the apex, the white hairs surpassing the apex by 1.5 mm; petals 3, hyaline, connate into a broad tube about 2.5 mm long and 1 mm wide at the middle, the free apical portions ovate, hyaline, about 0.7 mm long and 0.5 mm wide, barbellate-pilose at the apex; stamens 3, subincluded or very slightly exserted; filaments filiform, about 2 mm long, white, inserted near the base of the petals; anthers oblong, white, about 0.4 mm long, composed of 2 thecae; pistil-rudiment very small; pistillate florets subsessile: sepals 3, separate, white, lanceolate, about 2.7 mm long and 0.3 mm wide, attenuate to the acute apex, densely appressed-pilose with antrorse hairs; petals 3, separate at the base and apex, connate in the middle, white, barbate at the apex.

TYPE: *Julian A. Steyermark & John J. Wurdack 406*, swampy savanna above Summit Camp, alt. 1940 m, in the central section of Chimantá Massif, Bolívar, Venezuela, February 4, 1955 (NY). The species is said to be frequent at the type locality. All pistillate florets examined were extremely immature although the staminate florets in the same head were completely developed.

Syngonanthus rivularis Moldenke, sp. nov.

Herba parva annua; caulibus valde abbreviatis ad apicem densissime albido-tomentosis; foliis caespitosis leviter membranaceis linearibus parce minuteque pilosulis obtusis; pedunculis solitariis filiformibus stramineis 2-costatis adpresso-pilosulis; vaginis gracilibus arcte adpressis stramineis multistriatis minute parceque pilosulis, laminis obtusis; capitulis hemisphaericis griseo-albis; bracteolis involucri herbaceis brunneis oblongis obtusis glabris; receptaculo longe piloso.

Small annual herb; stems greatly abbreviated, very densely whitish-tomentose at the apex; roots elongate, white, spongy; leaves cespitose, thin-membranous, linear, pale green, erect, 2–4 cm long, rather uniformly 0.5 mm wide, sparsely and minutely pilosulous, blunt at the apex; peduncles solitary, filiform, stramineous, 19–21 cm long, 2-costate, antrorsely appressed-pilosulous, especially in the sulcations; sheath slender, closely appressed, 3–4.5 cm long, stramineous, many-striate, minutely scattered-pilosulous, the blade erect, appressed, about 3 mm long, obtuse at the apex; heads hemispheric, about 9 mm wide, grayish-white; involucral bractlets herbaceous, brownish, oblong, about 2 mm long and 1 mm wide, obtuse at the apex, glabrous; receptacle long-pilose; flowers long-pedicellate; receptacular bractlets subhyaline, oblong-oblanceolate, about 3 mm long and 0.7 mm wide, subacute at the apex, long-pilose at the base, otherwise glabrous; staminate florets: sepals 3, separate, hyaline, oblong-oblanceolate, more or less falcate, about 2 mm long and 0.7 mm wide, subacute at the apex, glabrous; petals

3, hyaline, connate at the base, separate at the apex, about 1.2 mm long, glabrous; stamens 3, short-exserted; anthers white, about 0.2 mm long; pistillate florets: sepals 3, separate, hyaline, navicular, concave, lanceolate, about 2.2 mm long and 0.6 mm wide, acute at the apex, glabrous; petals 3, hyaline, free at the base and apex, oblanceolate, about 1.7 mm long and 0.5 mm wide, glabrous; style abbreviated, about 0.2 mm long, glabrous, its 3 appendages slender, erect, about 1.2 mm long, borne at the same level as and alternate with the stigmas; stigmas 3, about 1 mm long; ovary globose, glabrous, stramineous, 3-sulcate, 3-celled.

TYPE: *Julian A. Steyermark & John J. Wurdack 792,* swampy depressions along the river in wet savannas along the east branch of the headwaters of the Río Tirica, alt. of 2120 m, in the central section of Chimantá Massif, Bolívar, Venezuela, February 12, 1955 (NY). The collectors state that the species was locally frequent, forming large masses.

Syngonanthus savannarum var. glabrescens Moldenke, var. nov.

Haec varietas a forma typica speciei recedit caulibus multiramosis, ramis ca. 10 cm longis dense foliosis et ubique glabris vel subglabratis.

TYPE: *Julian A. Steyermark & John J. Wurdack 539,* along a rivulet at the base of the Upper Falls of the Río Tirica above Summit Camp, growing in dense tufts, alt. 1940–1050 m, Central Section of the Chimantá Massif, Bolívar, Venezuela, February 7, 1955 (NY). The collectors note that the leaves are membranous, grass-green, ascending, the peduncles pale-green, the involucres gray-blackish, and the heads white, and that the plant is rare at the type locality.

Syngonanthus tiricensis Moldenke, sp. nov.

Herba pumila; caulibus valde abbreviatis ad apicem dense albido-tomentosis; foliis dense caespitosis linearibus vel graminoideis pluminusve subulatis obtusis glabris; pedunculis 1–3, griseis densiuscule albido-pilosis, pilis sericeis plusminusve subadpressis; vaginis gracilibus contortis multistriatis stramineis glabris, laminis obtusis glabris; capitulis hemisphaericis sordido-albidis; bracteolis involucri stramineis anguste ellipticis obtusis glabris nitidis; receptaculo glabro.

Dwarf herb; stems much abbreviated, with a dense mass of gray-white tomentum at the apex; leaves densely cespitose, erect, thin-textured but not membranous, bright-green, linear or grass-like, 5–18 mm long, more or less subulate, obtuse at the apex, glabrous, not fenestrate nor striate; peduncles 1–3, erect, grayish, 11–14.5 cm long, rather densely whitish-pilose with silky and more or less subappressed hairs; sheaths slender, 2–3 cm long, twisted, many-striate, stramineous, glabrous, the blade erect or suberect, about 4 mm long, obtuse at the apex, glabrous; heads buff-white, hemispheric 1–1.3 cm wide; involucral bractlets stramineous, rather firm, narrow-elliptic, about 4 mm long and 1.2 mm wide, obtuse at the apex, glabrous, shiny; receptacle glabrous; flowers pedicellate; staminate florets: sepals 3, separate, hyaline, oblong, about 2.5 mm long and 0.5 mm wide, obtuse or subacute at the apex, glabrous; petals 3, hyaline, connate at the base into a tube about 0.7 mm long, the free apical portions ovate, about 1 mm long, 0.5–0.7 mm wide, erect, rounded at the apex; stamens 3, slightly exserted; filaments rather stout, white, about 0.7 mm long, glabrous; anthers small, white, about 0.2 mm long and wide; pistillate florets not seen.

TYPE: *Julian A. Steyermark & John J. Wurdack 739*), among rocks in rocky and swampy savanna between the west and east branches of the headwaters of the Río Tirica, alt. 2120–2210 m, in the central section of Chimantá Massif, Bolívar, Venezuela, February 11, 1955 (NY).

Wurdackia Moldenke, gen. nov.

Herbae perennes, caulibus crassis elongatis; foliis rigidis distichis flabelliformibus; bracteolis involucri et receptaculi magnis; floribus omnibus perfectis pedicellatis; sepalibus 3, separatis; petalibus 3 praeter ad apicem separatis; staminibus 3 inclusis ad basin petalorum affixis; stylo brevissimo, appendicibus 3, bulboso-clavatis; stigmatibus 3, valde elongatis albidis bifidis; ovario subgloboso glabro 3-loculare.

TYPE species: W. *flabelliformis* Moldenke.

The genus is named in honor of John J. Wurdack, who has done noteworthy collecting in various parts of the United States, Canada, Japan, Brazil, and Venezuela.

Wurdackia flabelliformis Moldenke, sp. nov.

Herba perennis; caulibus simplicibus dense foliosis densissime tomentosis; foliis coriaceis patentibus arctissime imbricatis, ad apicem rotundatis vel subacutis, utrinque glabris; pedunculis paucis brunneis 4 vel 5-costatis glabris nitidis paullo contortis; vaginis gracilibus glabris multistriatis non contortis, laminis lanceolatis subulato-acutis glabris; capitulis hemisphaericis; bracteolis involucri fulvo-brunneis oblongis obtusis glabris; receptaculo glabro.

Perennial herb; stems simple, elongate, thick, to 16 cm long, very densely matted-tomentose, densely leafy; leaves coriaceous, rigid, wide-spreading, 2-ranked in fan-like fashion, very closely imbricate, uniformly 10–12 cm long, about 8 mm wide at the middle, rounded or subacute at the apex, the base hidden in the nigrescent tomentum of the stems, glabrous on both surfaces, shiny, many-veined but the parallel veins very obscure or indiscernible on both surfaces; peduncles few, borne on the upper portion but not at the apex of the stem, erect, brown, 13–16 cm long, 4- or 5-costate, glabrous, shiny, hardly twisted; sheaths slender, closely appressed to the peduncles, shorter than and hidden by the leaves, about 6 cm long, glabrous, many-striate, not twisted, obliquely split at the apex, the blade erect, lanceolate, about 2 cm long, appressed, subulate-acute at the apex, glabrous throughout; heads hemispheric, 1.6–1.9 cm wide; involucral bractlets tawny-brown, oblong, about 5.5 mm long and 1.2 mm wide, rather firm, obtuse at the apex, glabrous; receptacle glabrous; receptacular bractlets oblanceolate-spatulate, navicular-concave, black except at the base, about 6 mm long and 1.2 mm wide, obtuse or subacute at the apex, gradually attenuate to the base, glabrous except for the long-barbate apex, the white hairs beginning on the back somewhat below the apex and extending 2.2–2.5 mm beyond it; all the florets perfect, pedicellate; pedicels white, filiform, about 2 mm long; sepals 3, separate, elliptic, about 3.5 mm long and 1.5 mm wide, hyaline, obtuse or subacute at the apex, densely white-barbate at and near the apex, otherwise glabrous; petals 3, hyaline, separate except at the apex, about 3.2 mm long and 1.2 mm wide, obovate, rounded at the apex, gradually attenuate at the base, densely long-ciliate in barbate fashion at the apex; stamens 3, attached near the base of the petals, included; filaments filiform, white, glabrous, the free portion about 1.5 mm long; anthers white, oblong, about 0.4 mm long and 0.2 mm wide, composed of 2 thecae; style very short, about 0.2 mm long, its appendages 3, bulbous-clavate, stramineous, about 0.5 mm long, borne at the same level as and alternate with the stigmas; stigmas 3, hyaline, erect, about 2 mm long, bifid at the apex; ovary stramineous, subglobose, about 0.7 mm long and wide, glabrous, 3-sulcate, 3-celled.

TYPE: *Julian A. Steyermark & John J. Wurdack 671,* in moist places at the base of a rock and on dripping rocks of zanjone at the edge of the escarpment in and among zanjones, at the summit of Torono-tepuí, Chimantá Massif, Bolívar, Venezuela, alt. of 2165–2180 m, February 9, 1955 (NY). The collectors of this amazing species note that the plant was locally frequent, the caudex elongated in wet places, the leaves "spreading in 2 planes," the involucre of the head "tawny-brown, the heads white with blackish parts at base and around rim."

BROMELIACEAE[25]

1. **Lindmania serrulata var. reducta** L. B. Smith, var. nov.

Differt in partibus minor, florifera 6 dm alta; foliis 13 mm latis.

TYPE: frequent in dense rosettes on vertical southeast face of escarpment base at 1955 m alt., Agparamán-tepuí, Chimantá Massif, Bolívar, Venezuela, February 26, 1955, *J. A. Steyermark & J. J. Wurdack 1167.*

The typical variety of the species was described from Cerro Apácara, Río Caroní (Contr. U. S. Nat. Herb. 29: 283. 1949) and has been collected since in the central section of the Chimantá Massif.

5. **Lindmania argentea** L. B. Smith, sp. nov. (Fig. 78.)

E plantis vetustis solum cognita, caulescens, florifera metralis; caule ultra 15 cm longo, foliis vetustis dense vestito; foliis juvenilibus erectis, 6–7.5 dm longis, vaginis late ovatis, 4 cm longis, laminis linearibus, longe acuminatis, basi haud attenuatis, 15 mm latis, coriaceis, supra glabris, subtus dense argenteo-lepidotis, basi laxe obscureque denticulatis, vetustis revolutis; scapo erecto, gracili; scapi bracteis subfoliaceis, internodia multo superantibus, integris; inflorescentia laxe bipinnatim paniculata; bracteis primariis linearibus, quam ramis multo brevioribus; ramis patentibus, 17 cm longis, gracilibus, laxe florigeris, basi sterili nuda ad 6 cm longa; bracteis florigeris triangularibus, quam pedicellis gracilibus 7 mm longis subduplo brevioribus; floribus decurvato-subsecundis; sepalis valde imperfecte cognitis, late ellipticis, 4.5 mm longis; capsula ovoidea; seminibus longe bicaudatis.

TYPE: terrestrial, locally frequent on rocky slopes at 2165–2180 m alt., summit, at edge of escarpment in and among *zanjones*, Torono-tepuí, Chimantá Massif, Bolívar, Venezuela, February 9, 1955, *J. A. Steyermark & J. J. Wurdack* 678.

VENEZUELA: Bolívar: among *Bonnetia* and *Abolboda* thickets, *Bonnetia* forest at 2125–2300 m alt., northwestern part of Abácapa-tepuí, April 13, 1953, *J. A. Steyermark* 74936.

7. **Lindmania geniculata** L. B. Smith, sp. nov. (Fig. 79.)

Verisimiliter acaulis, florifera ad 1.3 m alta; foliis multis, 4 dm longis, vaginis late ovatis, 4 cm longis, glabris, prope apicem castaneis lucidisque, laminis angustissime triangularibus, 15 mm latis, pungentibus, prope basin laxe serrulatis, alibi integris, subtus dissite albo-flocculosis, supra mox glabris; scapo erecto gracili; scapi bracteis subfoliaceis, supremis quam internodia multo brevioribus; inflorescentia laxe bipinnata; axe geniculato; bracteis primariis eis scapi similibus, brevibus; ramis suberectis, 15 cm longis, dense multifloris, haud secundifloris; bracteis florigeris triangularibus, quam pedicellis graciliter obconicis 5 mm longis subduplo brevioribus; floribus subpatentibus; sepalis convolutis, late ovatis, 5 mm longis, integris; capsula ovoidea, 7 mm longa, rostro longo excluso; seminibus ignotis.

TYPE: around rocky swampy savanna at 2000–2100 m alt., rocky plateau on southeast-facing upper shoulder of Apácara-tepuí, below summit, Chimantá Massif, Bolívar, Venezuela, June 20, 1953, *J. A. Steyermark* 75774.

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[25] By Lyman B. Smith.

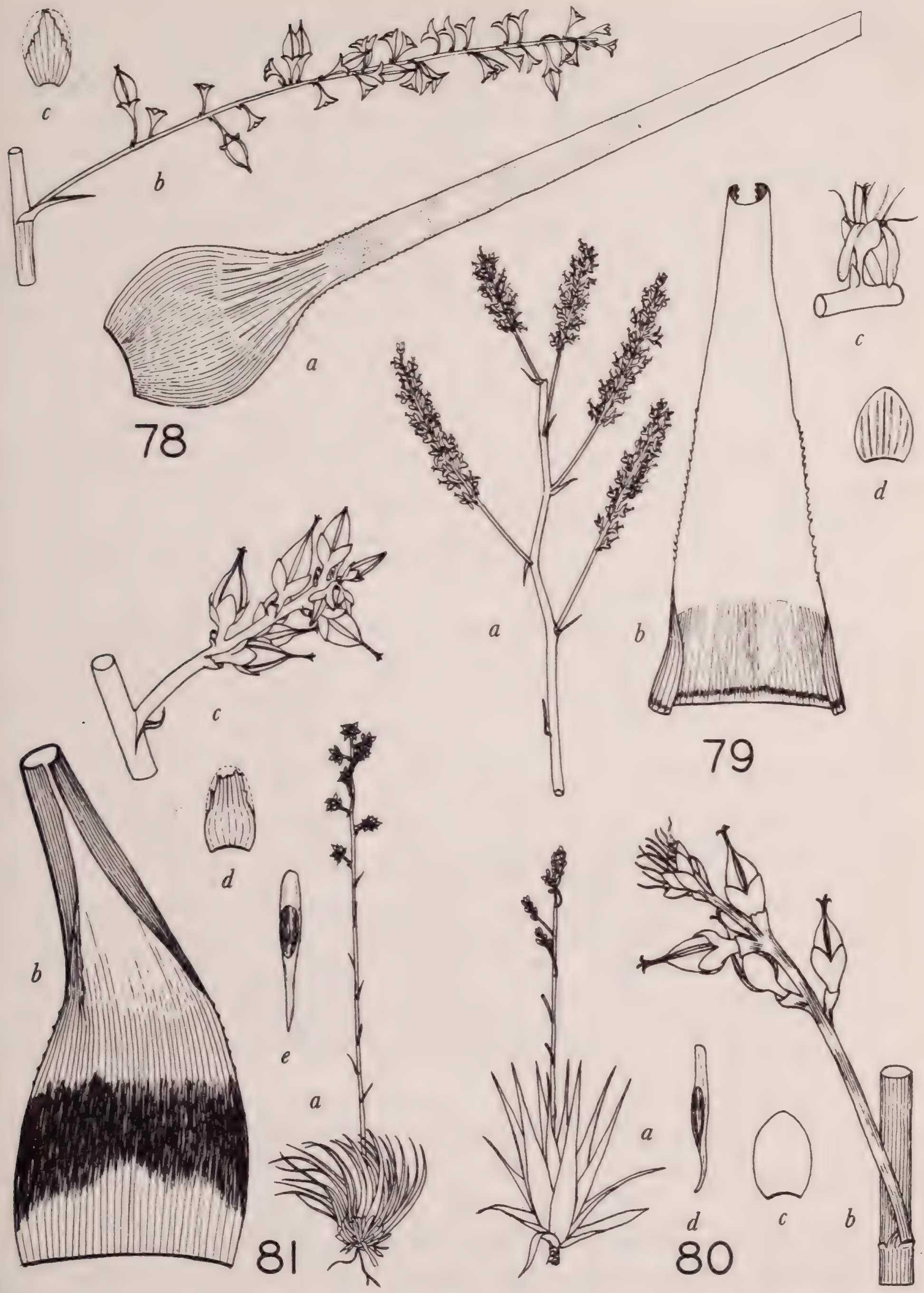


FIG. 78. *Lindmania argentea.* *a*, base of leaf, × ½; *b*, branch of inflorescence, × ½; *c*, sepal (reconstructed), × 2. From *Steyermark & Wurdack 678.* FIG. 79. *Lindmania geniculata.* *a*, scape and inflorescence, × ¼; *b*, base of leaf, × 1; *c*, flower, × 1; *d*, sepal, × 2. From *Steyermark 75774.* FIG. 80. *Lindmania brachyphylla.* *a*, habit, × 1/10; *b*, branch, × 1; *c*, sepal, × 2; *d*, seed, × 4. From *Wurdack 34134-B.* FIG. 81. *Lindmania steyermarkii.* *a*, habit, × 1/10; *b*, base of leaf, × 1; *c*, branch of inflorescence, × 1; *d*, sepal (reconstructed), × 2; *e*, seed, × 4. From *Steyermark & Wurdack 827.*

VENEZUELA: Bolívar; terrestrial, frequent, open dwarf forest at 2030–2150 m alt., north-facing slopes on summit above valley of Caño Mojado, Torono-tepuí, February 21, 1955, *J. A. Steyermark & J. J. Wurdack 1050.*

Without seeds it is not wholly certain that this species belongs to *Lindmania,* although its convolute sepals should exclude it from *Navia* and *Brocchinia.*

8. Lindmania brachyphylla L. B. Smith, sp. nov. (Fig. 80.)

Vetusta solum cognita, florifera 40–56 cm alta; foliis multis, rosulatis, 24 cm longis, integris, coriaceis, angustissime cartilagineo-marginatis, vaginis suborbicularibus, 4 cm longis, glabris, ex sicco stramineis apice brunneo vel rufescenti excepto, laminis lineari-lanceolatis, basi paulo angustatis, apice subulato-acuminatis, 33 mm latis, supra adpresse albo-lepidotis, subtus per aetate glabris; scapo erecto, 7 mm diametro; scapi bracteis subfoliaceis, supremis parvis, internodia subaequantibus; inflorescentia laxe bipinnatim paniculata; axe recto; bracteis primariis anguste triangularibus, quam ramis brevioribus; ramis 4–7 cm longis, secunde versis, prope apicem dense florigeris, eorum basibus sterilibus elongatis, nudis; bracteis florigeris ellipticis, pedicellos robustos 5 mm longos superantibus; floribus plus minusve secundis; sepalis ellipticis, 7 mm longis; petalis ignotis; capsula ovoidea, castanea; seminibus bicaudatis.

TYPE: abundant in large colonies on escarpment face and talus at 1900–2050 m alt., slopes and talus forest Sarvén-tepuí, Bolívar, Venezuela, January 13, 1953, *J. J. Wurdack 34134-B.*

VENEZUELA: Bolívar: locally abundant on upper escarpment face at 2200–2250 m alt., northwest cumbres, Churi-tepuí (Muru-tepuí), January 26, 1953, *J. J. Wurdack 34246.*

The second collection is a somewhat smaller plant than the type but differs in no essential characters.

9. Lindmania steyermarkii L. B. Smith, sp. nov. (Fig. 81.)

E planta vetusta solum cognita, acaulis, florifera 7 dm alta; foliis plurimis, valde secunde curvatis, 20 cm longis, vaginis late ovatis sed vix distinctis, 4 cm longis, laminis anguste triangularibus, ca. 15 mm latis, involutis, coriaceis, creberrime nervatis, viridibus, glabris, basi obscure denticulatis, alibi integris; scapo erecto, gracili, flexuoso; scapi bracteis linearibus, quam internodiis supremis brevioribus; inflorescentia laxe bipinnatim paniculata, angusta; axe geniculato; bracteis primariis imperfecte solum cognitis, linearibus; racemis divergentibus, 4 cm longis, longe stipitatis dense quaquaverseque paucifloris; bracteis florigeris verisimiliter ellipticis, pedicellos robustos 3 mm. longos superantibus; sepalis late ellipticis, 5.5 mm longis, late convexis, integris; capsula ovoidea, longe rostrata; seminibus bicaudatis.

TYPE: terrestrial, frequent, open forested laterite slopes along tributary of east branch of headwaters of Río Tirica at 2185–2210 m alt., Central Section, Chimantá Massif, Bolívar, Venezuela, February 13, 1955, *J. A. Steyermark & J. J. Wurdack 827.*

10. Lindmania tillandsioides L. B. Smith, sp. nov. (Fig. 82.)

Caulescens, perjuvenilis solum cognita; caule adscendenti, pauciramoso, ultra 2 dm longo; foliis multis, ad apicem caulis aggregatis, integerrimis, vaginis suborbicularibus, 2 cm diametro, dense nervatis, ex sicco aureo-brunneis, laminis angustissime triangularibus, 2 dm longis, 15 mm latis, conspicue cartilagineo-marginatis; scapo erecto, gracillimo, glabro, folia superanti; scapi bracteis angustissime triangularibus, erectis, supremis quam internodiis bene brevioribus; inflorescentia laxe bipinnatim paniculata, glabra; axe recto; bracteis primariis triangularibus, ramos juveniles paucifloros superantibus; bracteis florigeris late ellipticis, obtusis, 4 mm longis, pedicellos breves robustos multo superantibus, tenuibus; sepalis suborbicularibus, 5 mm longis, integris, tenuibus.

TYPE: common by waterfall over sandstone, *Bonnetia* forest, northwestern part of summit of Abácapa-tepui at 2125–2300 m alt., April 13, 1953, *J. A. Steyermark 74863.*

The extreme youth of the only collection of *Lindmania tillandsioides* and the extreme age of the material of its only near relative, *L. brachyphylla,* makes evaluation of the two species very difficult. The difference in the leaf-blades plus the difference in locality makes it seem probable that they are distinct species, but it is difficult to affirm or deny by characters of the inflorescence. Both have dense, few-flowered racemes with relatively long sterile bases and ample floral bracts, but the flowers of *L. tillandsioides* are too young to indicate if they will become secund and those of *L. brachyphylla* are too old to show the the complete form of floral bracts and sepals.

11. Lindmania subsimplex L. B. Smith, sp. nov. (Fig. 83.)

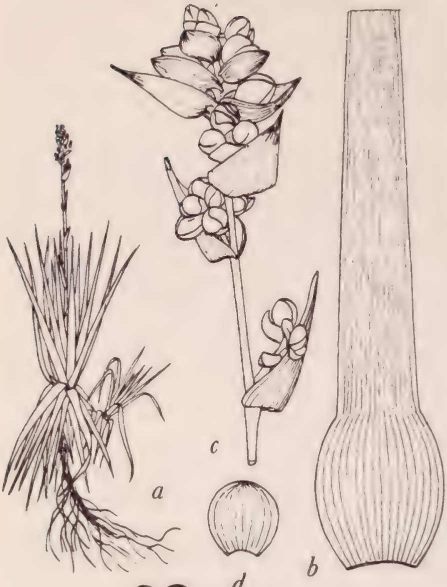
Acaulis, florifera 3–4 dm alta; foliis plurimis, 15 cm longis, inferioribus marcescentibus castaneisque, vaginis late ovatis, 15 mm longis, integris, juvenilibus ex sicco stramineis, laminis angustissime triangularibus, pungentibus, 7 mm latis, subdense serrulatis, supra glabris, subtus et margine albo-flocculosis , subtus mox glabris; scapo gracillimo; scapi bracteis linearibus, supremis quam internodia brevioribus; inflorescentia subsimplex, 9–12 cm longa, angusta, laxa, lepidibus linearibus minutis albis vestita; bracteis primariis linearibus, parvis; ramis brevissimis, fasciculatim paucifloris; bracteis florigeris anguste triangularibus, quam pedicellis robustis 3 mm longis brevioribus vel eos superantibus; sepalis latissime ellipticis, late convexis, 5 mm longis, integris, vetustis verruculosis; petalis aureis, brevissime unguiculatis, 9–11 mm longis, stamina superantibus, lamina suborbiculare; capsula ovoidea, castanea; seminibus late bicaudatis.

TYPE: terrestrial on rocky hummocks bordering large swamp at 2450–2500 m alt., east-central portion of summit of Apácara-tepuí, Chimantá Massif, Bolívar, Venezuela, June 21–22, 1953, *J. A. Steyermark 75924.*

VENEZUELA: Bolívar: around rocky swampy savanna, rocky plateau, on southeast-facing upper shoulder of Apácara-tepuí, below summit at 2000–2100 m alt., June 20, 1953, *J. A. Steyermark 75775.* Locally frequent in exposed rock crevices at 2165–2180 m. alt., summit, at edge of escarpment in and among *zanjones,* Torono-tepuí, Chimantá Massif, February 9, 1955, *J. A. Steyermark & J. J. Wurdack 653.* Terrestrial, common at 2260 m alt., rocky escarpment between west and east branches of headwaters of Río Tirica, Central Section, Chimantá Massif, February 13, 1955, *J. A. Steyermark & J. J. Wurdack 873.*

13. Lindmania stenophylla L. B. Smith, sp. nov. (Fig. 84.)

Acaulis; foliis plurimis, vaginis late ovatis, ca. 3 cm longis, bulbum globosum efformantibus, apice castaneis, laminis linearibus, longe acuminatis, basi nullo modo attenuatis, 6 dm longis, inflorescentiam multo superantibus, basi 10 mm latis, integris, subcoriaceis, supra glabris viridibusque, subtus dense adpresseque argenteo-lepidotis; scapo 6 cm longo, 4 mm diametro, albido-arachnoideo; scapi vaginis foliaceis, inflorescentiam superantibus; inflorescentia bipinnata, dense cylindrica, 13 cm longa, 3 cm diametro, petalis exceptis albido-arachnoidea; bracteis primariis linearibus, ramos infimos superantibus; ramis brevissimis, densifloris, haud secundifloris; bracteis florigeris anguste triangularibus, pedicellis crassiusculis 2–3 mm longis superantibus; sepalis plerumque convolutis, paulo asymmetricis, late ovatis, cucullatis, 5 mm longis, obscure serrulatis;



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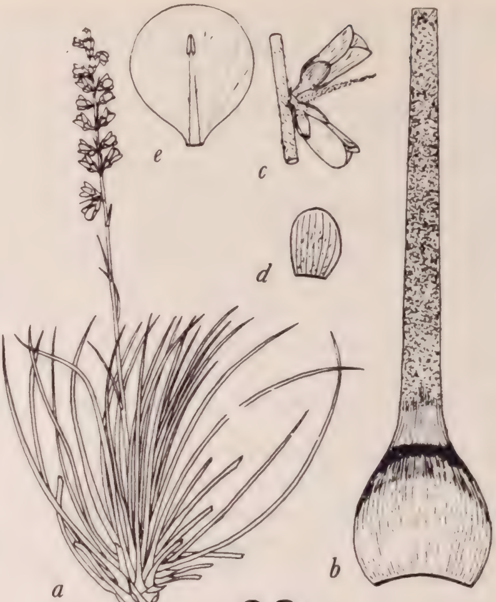

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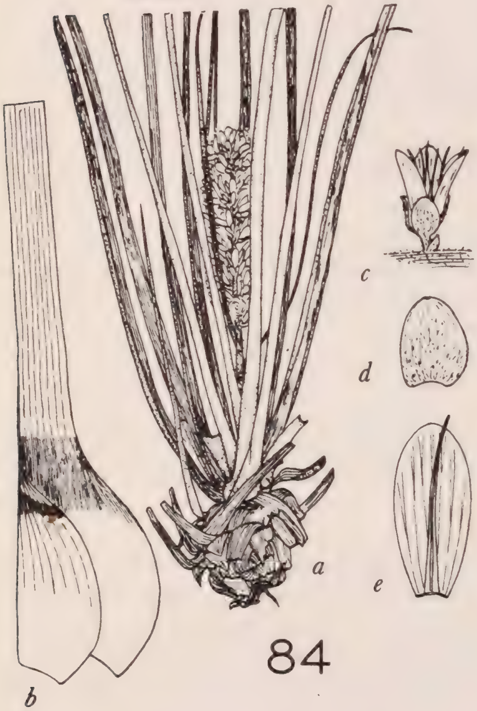

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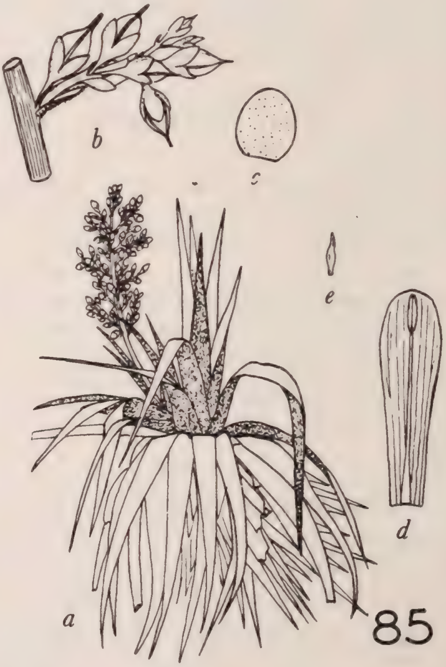

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FIG. 82. *Lindmania tillandsioides.* *a*, habit, × 1/10; *b*, base of leaf, × 1; *c*, inflorescence, × 1; *d*, sepal, × 2. From *Steyermark 74863.* FIG. 83. *Lindmania subsimplex.* *a*, habit, × 1/4; *b*, base of leaf, × 1; *c*, branch of inflorescence, × 1; *d*, sepal, × 2; *e*, petal and stamen, × 2. From *Steyermark 75924.* FIG. 84. *Lindmania stenophylla.* *a*, habit, × 1/4; *b*, base of leaf, × 1; *c*, flower, × 1; *d*, sepal, × 2; *e*, petal and filament, × 2. From *Steyermark & Wurdack 951.* FIG. 85. *Lindmania minor.* *a*, habit, × 1/4; *b*, branch of inflorescence, × 1; *c*, sepal, × 2; *d*, petal and stamen, × 2; *e*, ovule, × 5. *a–c* from *Steyermark & Wurdack 685.*

petalis ellipticis, obtusis, 12 mm longis, haud unguiculatis; staminibus verisimiliter exsertis; capsula ovoidea; seminibus fusiformibus, breviter bicaudatis.

TYPE: terrestrial, locally frequent, along banks of Caño Mojado, east of north escarpment, below upper falls of Caño Mojado at 1895–1910 m alt., Torono-tepuí, Chimantá Massif, Bolívar, Venezuela, February 20, 1955, *J. A. Steyermark & J. J. Wurdack 951.*

One flower was found with cochleate sepals and the seeds are short-caudate, making the species appear transitional to *Navia.*

14. Lindmania minor L. B. Smith, sp. nov. (Fig. 85.)

Breviter caulescens, florifera ad 13 cm alta; foliis multis, vaginis late triangularibus, 15 mm longis, vetustis brunneis, lucidis, supra dissite albo-flocculosis, laminis anguste triangularibus, pungentibus, ad 10 cm longis, 12 mm latis, obscure laxeque denticulatis, supra glabris lucidisque, subtus dense adpresseque albo-flocculosis; scapo brevi, gracili, flocculoso; scapi bracteis subfoliaceis, internodia multo superantibus; inflorescentia subdense bipinnata, ad 8 cm longa, albo-flocculosa; bracteis primariis angustissime triangularibus; ramis 2 cm longis, laxe florigeris; bracteis florigeris triangularibus, quam pedicellis graciliter obconicis 5 mm longis subduplo brevioribus; floribus plus minusve erecto-secundis; sepalis late ellipticis, obtusis, 4.5 mm longis, late convexis; petalis anguste spathulatis, obtusis, 13 mm longis; capsula ovoidea, longe rostrata; seminibus breviter bicaudatis.

TYPE: exposed rock crevices, summit, at edge of escarpment, Torono-tepuí, Chimantá Massif, Bolívar, Venezuela, February 9, 1955, *J. A. Steyermark & J. J. Wurdack 654.* Numbers 685 and 678-*A* from the same locality are this species although the latter has a reduced subsimple inflorescence.

VENEZUELA: Bolívar: on large rock bordering savanna above Summit Camp at 1940 m alt., Central Section, Chimantá Massif February 4, 1955, *Steyermark & Wurdack 394.*

15. Lindmania navioides L. B. Smith, sp. nov. (Fig. 86.)

Caulescens; caule simplici, recto, ad 5 dm longo, 6 mm diametro, foliis vetustis deflexis densissime induto; foliis supremis erectis, pallide viridibus, dense albo-cretaceis, tenuibus, integris, vaginis late ovatis, 1 cm longis, laminis anguste triangularibus, acuminatis, pungentibus, 6 cm longis, 9 mm latis, planis; scapo nullo; inflorescentia terminali, foliis abscondita, corymbosa, pauciflora, glabra; bracteis florigeris angustissime triangularibus, pedicellos 9 mm longos superantibus; sepalis late lanceolatis, obtusis, 9 mm longis, tenuibus sed basi plus minusve incrassatis; petalis anguste spathulatis, obtusis, 18 mm longis, stamina subaequantibus; capsula ovoidea, longe rostrata, castanea, lucida; seminibus anguste fusiformibus, longe bicaudatis.

TYPE: on bluffs, summit, at edge of escarpment in and among *zanjones* at 2165–2180 m alt., Torono-tepuí Chimantá Massif, Bolívar, Venezuela, February 9, 1955, *J. A. Steyermark & J. J. Wurdack 677.*

VENEZUELA: Bolívar: locally frequent on bluff base, northwest-facing forested slopes between Summit Camp and base of escarpment, 1880–1970 m alt., Torono-tepuí, Chimantá Massif, Feb. 27, 1955, *Steyermark & Wurdack 1198.* Crevices of large rocks on upper shaded side of deep fissure at 2450–2500 m alt., east-central portion of summit of Apácara-tepuí, Chimantá Massif, June 21–22, 1953, *J. A. Steyermark 75892.*

6. Navia wurdackii L. B. Smith, sp. nov. (Fig. 87.)

Breviter caulescens; caule adscendenti; foliis multis, vaginis parvis, quam laminis vix latioribus, brunneis, laminis patentibus, curvatis, linearibus, acuminatis, 3–6 dm longis, 20–25 mm latis, viridibus cum linea mediana lata pallida pictis, supra glabris, subtus lepidibus minutis albis dissite obtectis, spinis

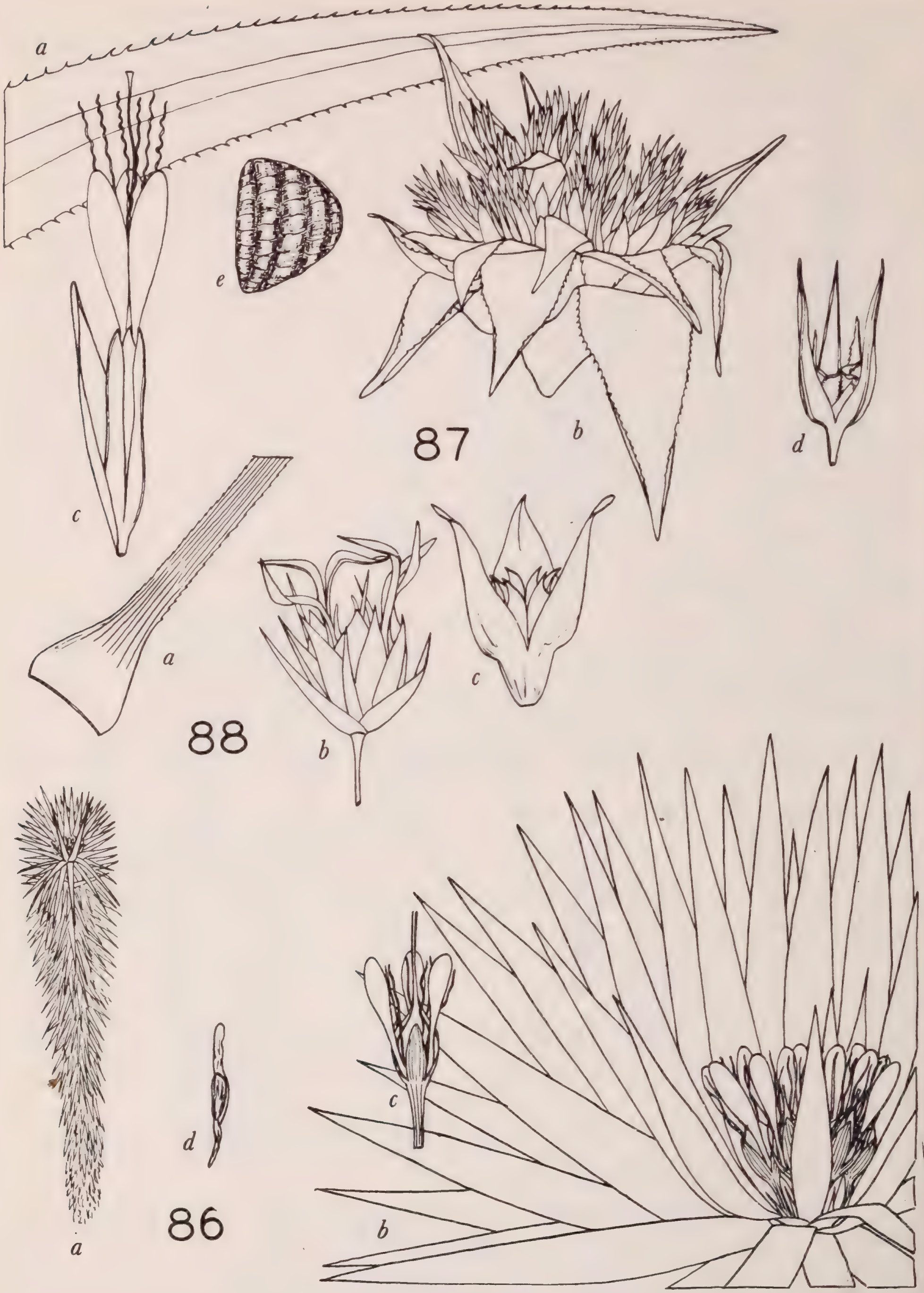

FIG. 86. *Lindmania navioides.* *a*, habit, × 1/10; *b*, inflorescence, × 1; *c*, flower, × 1; *d*, seed, × 4. From *Steyermark & Wurdack 677.* FIG. 87. *Navia wurdackii.* *a*, apex of leaf, × 1; *b*, inflorescence in fruit, × 1/2; *c*, floral bract and flower, × 1; *d*, fruit, × 1; *e*, seed, × 10. From *Wurdack 34324.* FIG. 88. *Navia scopulorum.* *a*, base of leaf, × 1; *b*, inflorescence, × 1; *c*, fruit, × 2. From *Steyermark 75613.*

rectis applanatis 2 mm longis sublaxe armatis; scapo nudo, brevi, vaginis foliorum omnino occulto; inflorescentia hemisphaerica, digitato-glomerata, 4–6 cm diametro; bracteis exterioribus subfoliaceis, latis, inflorescentiam involucrantibus et flores subaequantibus, basi rubris; bracteis florigeris lanceolatis, acuminatis, sepala subaequantibus, apice incrassatis, integris vel obscure serrulatis, rubris; floribus breviter crasseque pedicellatis; sepalis liberis, lanceolatis, rectis, acuminatis, 22–30 mm longis, integris, rubris, obscure lepidotis; petalis 5 cm longis, obtusis, pulcherrime aureis, apice macula viridi ornatis; staminibus styloque longe exsertis; ovario supero; seminibus nudis, corrugatis, nigris.

TYPE: on soil-covered cliff-face along Río Sarven near Camp 9 at 1200 m alt., Sarvén-tepuí, Bolívar, Venezuela, February 7, 1953, *J. J. Wurdack 34324*.

VENEZUELA: Bolívar: Chimantá Massif: on shaded sandstone boulders and on bluffs above, trail between Camp 3 and Camp 4, vicinity of stream between northwestern part of Abácapa-tepuí and Apácara-tepuí at 1200–1600 m alt., April 19, 1953, *J. A. Steyermark 75159*. Common on vertical sandstone banks and boulders, southwestern-facing forested slopes of Chimantá-tepuí (Torono-tepuí), between base Camp and steep slopes above valley of Río Tirica at 1000–1400 m alt., May 15, 1953, *J. A. Steyermark 75392*. Common all along shaded bluffs at base where damp, along southwest-facing sandstone bluffs of Chimantá-tepuí (Torono-tepuí) near southern corner at 1700 m alt., May 19, 20, 1953, *J. A. Steyermark 75495*.

34. **Navia scopulorum** L. B. Smith, sp. nov. (Fig. 88.)

Dense aggregata; caule imperfecte solum cognito, 8 mm diametro; foliis plurimis, patentibus, 14 cm longis, vaginis late ovatis, 15 mm longis, integris, brunneis, tenuibus, glabris, laminis linearibus, acuminatis, basi haud attenuatis, 6 mm latis, ex sicco involutis, laxe serrulatis, mox glabris; scapo gracili, 1 cm longo, omnino occulto; inflorescentia nidulanti, pauciflora, glabra; bracteis exterioribus e late ovato longe acuminatis, ad 2 cm longis, apice obscure serrulatis; floribus subsessilibus; sepalis liberis, cochleari-imbricatis, lanceolatis, acuminatis, 11–15 mm longis; petalis 25 mm longis; ovario ½ infero; capsula ellipsoidea, 7 mm longa.

TYPE: leaves rich green on both sides, not glaucous as in number 75497, in dry crevices at base of bluff, densely forested slopes along trail from Base Camp to Bluff Camp, western slopes of Chimantá-tepuí (Torono-tepuí) at 1100–1700 m alt., Chimantá Massif, Bolívar, Venezuela, May 30, 31, 1953, *J. A. Steyermark 75613*.

VENEZUELA: Bolívar: leaves rigid, coriaceous, rich green in upper half, silvery gray in lower half, below gray or pale green, bracts erect, rigid, silvery-yellow green, in crevices and on sheer walls, often pointing downward, along base of southeast-facing sandstone bluffs of Chimantá-tepuí (Torono-tepuí), from south corner northeastward at 1700 m alt., May 21, 1953, *J. A. Steyermark 75497*.

Tillandsia turneri var. orientalis L. B. Smith, var. nov.

Tillandsia rhodocincta Baker, Jour. Bot. 26: 143. 1888.
Tillandsia multifolia Mez, Repert. Spec. Nov. 12: 420. 1913.

Differt in omnibus partibus minor, florifera 15–40 cm alta; laminis foliorum 15–30 mm latis; inflorescentia pauciramosa vel simplici; spicis paucifloris; sepalis 13–15 mm longis.

TYPE: epiphyte, vicinity of Summit Camp along Río Tirica at 1925 m alt., Central Section, Chimantá Massif, Bolívar, Venezuela, February 18, 1955, *J. A. Steyermark and J. J. Wurdack 928*.

VENEZUELA: Bolívar: Mount Roraima summit, December 18, 1884, *im Thurn 316* (type of *Tillandsia rhodocincta* Baker); *McConnell & Quelch 671*. On shrubs, frequent in upper part of upper cumbre at 2300–2350 m alt., northwest cumbres, Churí-tepuí (Muru-Tepuí), February 3, 1953, *J. J. Wurdack 34305*. Amazonas: Cerro Yavi summit at 2200 m

alt., March 1–3, 1947, *K. D. Phelps & C. B. Hitchcock 67.* On tree trunks, occasional in scrub forest 1–3 km north of Cumbre Camp at 1700–1800 m alt., Cerro de la Neblina, Río Yatua, January 10, 1954, *B. Maguire, J. J. Wurdack & G. S. Bunting 37224.* BRAZIL: Branco: Humirida Mountains, 1863–64, *Appun 1416.* Slopes of Mount Roraima at 2100 m alt., January 1910, *Ule 8558* (type of *Tillandsia multifolia* Mez).

I have taken advantage of the opportunity to retypify this taxon from more familiar material on changing the category to which it belongs.

PIPERACEAE[26]

Piper deminutum Yuncker, sp. nov.

Suffrutex ligno molli glaber nodosus; foliis oblongo-lanceolatis, apice sensim longe acuminatis, basi subinaequilateraliter acutis a medio infero pinnatim venosis, nerviis utrinque ca. 3–4 seorsum laqueatis; petiolo ad medium vel ultra vaginato-alato; bracteis triangulari-subpeltatis margine conferte luteo-fimbriatis; drupa glabra obpyramidali-trigona; stigmatibus parvis sessilibus.

A small, softwooded, glabrous, nodose, rhizomatous shrub up to 50 cm (or occasionally 1.5 m) tall, the twigs slender; leaves oblong-lanceolate, with gradually long-acuminate, subapiculate apex and equilateral or more commonly inaequilaterally acute base, 1.3–2 (–4) cm wide, 8–11 (–15) cm long, pinnately nerved from below the middle, the nerves about 3 or 4 on each side, abruptly curved and loop-connected upward, with slender nervules cross-connecting with the midrib to near the tip, drying thin, translucent, finely pellucid-dotted, the petiole from 5 mm long above to 2 or sometimes 3 cm long on the lower leaves, vaginate-winged to the middle or above; spikes 3 mm thick, 2–3 (–5) cm long, the peduncle slender, to 2 cm long, the bracts triangular-subpeltate, strongly yellow-fringed, the drupe glabrous, strongly obpyramidal-trigonous, with depressed-truncate apex, the stigmas small, sessile.

Distribution: Western British Guiana and southeastern Venezuela.

TYPE: VENEZUELA: Bolívar: Uaipán-tepuí, bush about 0.5 m tall, in wet forest near waterfall, alt. 1400 m, Jan. 27, 1948, *Kathleen D. Phelps & Charles B. Hitchcock 356* (NY).

VENEZUELA: Bolívar: Chimanta Massif, rich rainforest on lower northwestern slopes of Abácapa-tepuí, vicinity of Camp 1 along Río Abácapa, subherbaceous, spikes ascending, white, turning green, at first 2 mm thick, becoming 3 mm thick, leaves membranous, erect, dark green above, pale green below, alt. 420 m, Mar. 30–31, 1953, *Julian A. Steyermark 74768* (F; NY); forested slopes, along trail between Camp 2 and Camp 3, northwestern part of Abácapa-tepuí, along stream vicinity of Camp 2, leaves firmly membranous, dark green above, pale green below; spikes ascending, whitish, alt. 750–1100 m, Apr. 5, 1953, *Julian A. Steyermark 74840* (F; NY); along southwest-facing sandstone bluffs of Chimantá-tepuí (Torono-tepuí) near southern corner, herb by waterfall, leaves subcoriaceous, deep green above, pale green below; spikes erect, buff-green, 3 mm in diameter; stems 3–5 mm in diameter, swollen at nodes to 8 mm, alt. 1700 m, May 19–20, 1953, *Julian A. Steyermark 75485* (F; NY); Steyermark Falls (Steyermark-Merú) on upper reaches of Río Tirica (left-hand fork), separating eastern part of Apácara-tepuí from western part of Chimantá-tepuí (Torono-tepuí), alt. 1700–1750 m, July 3, 1953, *Julian A. Steyermark 76019* (F; NY); along Río Tirica (Río Aparurén) just above Techiné-merú, herbaceous, leaves dull green above, pale green below; inflorescence erect, whitish, 3 mm diam., frequent in middle gorge forest, alt. 470 m, Jan. 16, 1955, *Julian A. Steyermark & John J. Wurdack 119* (F; NY) (this specimen is reported as being up to 1.5 m tall but it otherwise agrees well with the other specimens cited); Torono-tepuí, vicinity of Lower Falls of Río Tirica, on northwest side of falls, locally frequent; leaves ascending, membranous, dull green above, silvery green below tinged dull lavender basally; petioles dull madder; stem deep purple, 2.5 mm diam., enlarged at nodes; peduncles erect, dull lavender, 1 m diam.; spikes erect, creamy white, 2 mm diam., alt. 1000–1090 m, Mar. 6, 1955, *Julian A. Steyermark & John J. Wurdack 1277* (F; NY).

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[26] By T. G. Yuncker.

BRITISH GUIANA: Pakaraima Mountains, Kamarang River, Wenamu Trail, rare, by landing place between Paruima Falls and Paruima Mission, shrublet to 25 cm high, rhizomatous; fl. spikes pale cream, alt. 600 m, Nov. 8, 1951, *Bassett Maguire & D. B. Fanshawe 32446* (NY).

The small, subwoody plants, the narrow leaves with vaginate-winged petioles, the slender peduncle, short spikes, and obpyramidal-trigonous, glabrous drupes characterize this species. It bears a slight resemblance to *P. suratanum* Trel. & Yun. of Colombia but differs in the type of nervation, shape of fruit, and more densely fringed bracts. From *P. salicifolium* Vahl of Suriname, also with narrow leaves, it differs in its somewhat larger, glabrous, non-scabrid leaves, and longer peduncles. It also differs from *P. eucalyptifolium* Rudge of British Guiana, with which it bears some resemblance, in the size of plant and shape of leaves, in its more slender spikes, characters of the drupe, etc.

Piper chimantanum Yuncker, sp. nov.

Suffrutex ligno molli nodosus, caule glabro; foliis lanceolato-ellipticis, apice subfalcatim longo-acuminatis, basi acutis obtusisve, aequilateralibus vel subinaequilateralibus glabris vel subtus ad venas sub margine parcius adpresse hirtulis, seorsum ciliolatis, a tertio supero deorsum pinnatim venosis, nerviis ca. utrinque 5, petiolo fere ad laminam vaginato-alato; pedunculo gracili, bracteis rotundato-subpeltatis plus minusve umbonatis conferte luteo-fimbriatis, drupa trigona apice depressa, stigmatibus sessilibus.

A soft-wooded, branching, nodose shrub scarcely 1 m tall, "dull purplish at the nodes" [this character not evident in the dried specimen], the stem 6 mm thick at the base when dry, glabrous, the internodes mostly 6–8 cm long; leaves lance-elliptic, the apex subfalcately long-acuminate, the base acute or obtuse, equilateral or one side slightly shorter, 4-7 cm wide, 15-19 cm long, "membranous, dark green above, silvery green below with elevated nerves, the midrib dull lavender at base" when growing, pinnately nerved to the upper one-third, the nerves about 5 on each side, with cross-connecting nervules, drying subopaque, dark above, paler beneath, glabrous, or the nerves near the margin beneath sparsely subappressed hirtellous, the margin ciliolate at least above the middle, the petiole "green with purplish stripes" when growing, up to 1.5 cm long, glabrous, vaginate and broadly winged to near the blade; spikes 1–2 mm thick 4 cm long, the peduncle slender, glabrous, 2 cm long, the bracts round-subpeltate, somewhat umbonate, strongly yellow-fringed, the ovary trigonous with pointed apex, the drupe exserted, trigonous with depressed apex, the stigmas sessile.

TYPE: VENEZUELA: Bolívar: Chimantá Massif, between Bluff Camp and low promontory north of Bluff Camp, along west-facing portion of Chimantá-tepuí (Torono-tepuí), slopes near waterfall, alt. 1600–1700 m, June 5, 1953, *Julian A. Steyermark 75673* (F, as sheet no. 1,443,524; NY).

The small, subherbaceous, essentially glabrous plants, the strongly vaginate-winged petiole, and the rather short, slender spikes with trigonous, exserted drupes are distinctive characters of this species. It resembles *P. steyermarkii* Yun., also from Bolívar, in some respects, but that species is scandent, has the lateral nerves arising from the lower half of the blade, spikes 5 mm thick, and subglobose, stylose drupes.

Peperomia chimantana Yuncker, sp. nov.

Herba epiphytica diffusa; ramulis conferte hirtellis, pilis minutis erectis; foliis alternis, ellipticis vel obovatis emarginatis, basi acutis, petiolo pergracili hirtello; spicis terminalibus axillaribusque; drupa ovoidea apice obliqua, stigmate subapicali.

A small, spreading epiphyte; stem 2 mm thick at the base when dry, the branches ascending 8–10 cm from the decumbent base, rooting from the lower nodes, densely minutely hirtellous, the hairs erect, the internodes 1 cm long toward the base, shorter upward; leaves alternate, elliptic, or the lower obovate, narrowed to the blunt, emarginate apex, or the apex of the lower leaves rounded and retuse, the base acute, 5–8 (–10) mm wide, 1.2–1.8 cm long, "subcoriaceous, rich green above, pale green suffused with rose-orchid below with midrib and 2 lateral nerves green" when growing, palmately 3-nerved, glabrous above, paler and hirtellous beneath, at least along the nerves, ciliolate toward the apex, drying brown, subopaque, the petiole very slender hirtellous, mostly 3–7 mm long; spikes terminal and axillary, scarcely 1 mm thick and 2 cm long, "pale green" when growing, the peduncle scarcely more than 5 mm long, glabrous, the bracts round-peltate, the drupe ovoid with oblique apex, the stigma subapical.

TYPE: VENEZUELA: Bolívar: Chimantá Massif, moist mossy forest, vicinity of camp 4, southwestern edge of Apácara-tepuí, epiphyte on moist trunk, alt. 1600–1800 m, Apr. 15, 1953, *Julian A. Steyermark 75016* (F, as sheet no. 1,443,515; NY).

This species is characterized by its hirtellous stems and emarginulate, 3-nerved leaves which distinguish it from *P. calimana* Trel. & Yun., *P. tafelbergensis* Yun., and *P. jamesoniana* C.DC., species to which it bears some slight resemblance. From the last-named species it also differs in its larger leaves.

Peperomia wurdackii Yuncker, sp. nov.

Herba repens epiphytica; caule pergracili crispe pubescenti; foliis alternis ellipticis utrinque acutis supra crispe puberulis glabratisve subtus glabris ciliolatis palmatim 3-nerviis; petiolo glabrato; spicis terminalibus atque in axillibus superis pedunculo glabrato; drupa globoso-ovoidea apice obliqua, stigmatibus subapicalibus.

A very slender, spreading, epiphytic herb; stem filiform, less than 1 mm thick when dry, freely branching, prostrate and rooting at the nodes, with fertile branches ascending up to about 5 cm, moderately crisp-pubescent, the hairs mostly upwardly curved, the internodes mostly less than 1 cm long; leaves alternate, elliptic, the apex gradually acute or sometimes obtusish, the base acute, 3–6 mm wide, 8–15 mm long, crisp-pubescent glabrescent above, paler and glabrous beneath, ciliolate, palmately 3-nerved, with a very slender submarginal nerve as seen by transmitted light, the midrib delicately branched upward, drying thin and translucent, the petiole filiform, 2–4 mm long, glabrous, clasping at the base; spikes terminal and axillary, 0.5 mm thick, 3–4 cm long, loosely flowered, the peduncle about 5 mm long, glabrous, the bracts round-peltate, the drupe globose-ovoid with oblique apex and subapical stigma.

TYPE: VENEZUELA: Bolívar: epiphyte on lower part of tree trunk, occasional on forested slopes below the south rim of savanna plateau, vicinity of Mission Santa Teresita de Kavanayáyen, alt. 1200–1300 m, Dec. 11, 1952, *Bassett Maguire & John J. Wurdack 33762* (NY).

The crisp-pubescent, filiform stems and especially the elliptic leaves acute at both ends distinguish this species. It appears to be near *P. truncivaga* C.DC. but differs in its smaller leaves and longer spikes. It also bears a resemblance to *P. calimana* Trel. & Yun., which, however, has somewhat larger leaves that are commonly wider above the middle and rounded-obtuse at the apex.

ANNONACEAE[27]

Anaxagorea petiolata R. E. Fr. Lloydia 2: 179. 1939.

Venezuela, Estado Bolívar, in rainforest at base of Ptari-tepuí, elev. 1100 m, Dec. 18, 1952, *Bassett Maguire & John J. Wurdack 33819.*

Tree 12 m, cauliflorous and ramiflorous. Previously known from British Guiana, Kanuku Mountains.

COMPOSITAE[28]

Alomia ballotaefolia Maguire, Steyermark & Wurdack, sp. nov.

Herbacea annua 3.5–5 dm alta, caulibus vinaceis teretibus erectis subsimplicibus vel pauciramosis dense puberulis, 2–4 mm diam.; foliis plerumque oppositis petiolatis, petiolis 1–2.5 cm longis, dense puberulis; laminis membranaceis ovato-deltoideis vel rhomboideis grosse inaequaliterque dentatis vel parce lobatis, supra molliter puberulis subtus dense molliter strigosis, 1.5–5.5 cm longis 1–3.5 cm latis, apice subacutis vel obtusiusculis basi cuneatis vel subtruncatis, penninerviis nervis lateralibus utroque latere 2–4, dentibus utroque latere 5–8 obtusis vel rotundatis; capitulis 11–14-floris ad apices ramorum modice numerosis corymbulis confertis dichotome dispositis campanulatis, 4–4.5 mm longis 3–4 mm latis; involucri bracteis 12–14, 3–4-seriatis viridibus infimis lineari-lanceolatis vel anguste lanceolatis acutiusculis, 1.8–2 mm longis, extus dense hirtellis pilis adscendentibus, ceteris lanceolatis vel elliptico-lanceolatis acuminatis vel subacuminatis, 2.5–3 mm longis 0.5–0.8 mm latis, extus dense hirtellis prominenter 3-costatis; receptaculo subhemisphaerico subalveolato glabro paleifero; floribus lilacinis, 2.5 mm longis, in tubum proprium et fauces distinctas paullo differentiatis, a basi ad limbum sensim ampliatis, tubo extus parce glanduloso-puberulo limbo glabro, lobis ovatis hebeti-acutis 0.5 mm longis glabris; paleis nonnullis tenuibus oblanceolatis vel ligulato-oblanceolatis cuspidato- vel subito acuminatis, 2.2–2.5 mm longis 0.5 mm latis, extus parte superiore puberulis; achaeniis prismaticis nigris, 1.5 mm longis 0.4 mm latis, calvis apice annulo carnoso integerrimo.

TYPE: along base of southeast-facing sandstone bluffs of Chimantá-tepuí (Torono-tepuí), Chimantá Massif, Bolívar, Venezuela, 1700 m alt., May 21, 1953, *Julian A. Steyermark 75520* (holotype F, isotype NY).

This species most closely resembles *A. angustata* (Gard.) Benth. and *A. regnellii* Malme, both from Brazil. From the former it differs in the receptacular pales, shorter phyllaries, opposite leaves, and dense non-glandular pubescence of leaves and involucre. From the latter it may be distinguished by the glandular-puberulent outside of the corolla tube, more or less differentiation of corolla into tube and limb, 11–14- instead of 40-flowered heads, the presence of receptacular pales, and dense, non-glandular pubescence of stems and leaves.

Eupatorium ibaguense Schultz-Bip. var. **indiscretum** Maguire, Steyermark & Wurdack, var. nov.

A typo differt foliis anguste ovatis acutis vel parce acuminatis obscure serrulatis (mucronibus callosis ca. 0.5 mm altis utrinque ca. 6) basi late cuneatis supra basin 3-plinerviis vel obscure 5-plinerviis, 4–9 cm longis 2–3 cm latis; corollae lobis apicem versus puberulis; achaeniis 2.3–2.5 mm longis.

TYPE: frequent along lower escarpment face, Sarvén-tepuí, Chimantá Massif, Bolívar, Venezuela, 1900–2050 m alt., Jan 13, 1953, *John J. Wurdack 34112* (holotype NY, isotype F).

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[27] By R. E. Fries.

[28] *Mikania florida* by Leandro Aristeguieta.

Mikania florida Aristeguieta, sp. nov.

Frutex volubilis; caule tereti juventate puberulo tardius glabrato; foliis oppositis petiolatis lanceolato-oblongis apice subacutis basi rotundatis vel subobtusis, 4–6 cm longis, 1.8–3 cm latis, utrinque glabris integris chartaceo-membranaceis subtrinervatis; petiolo 8–12 mm longo glabro; paniculis terminalibus et lateralibus; capitulis ca. 8 mm altis; pedicellis 2–7 mm longis; bracteolis lanceolatis 4 mm longis; involucri squamis lanceolatis apice acutis, 6–7 mm longis dorso puberulis vel glabris; corollis 4.2 mm longis, glabris; tubo proprio 2 mm longo; dentibus limbi 0.7 mm longis; achaeniis 4 mm longis sparse puberulis vel glabris dense glandulosis; pappi setis albis 4 mm longis.

TYPE: woody vine in low trees, flowers white, upper northwest cumbre of Churi-tepuí (Murú-tepuí), alt. 2250–2300 m, Edo. Bolívar, Venezuela, Jan. 26, 1953, *John J. Wurdack 34226.* (NY).

This species is related to *M. lucida* Blake, from which it can easily be differentiated by its larger heads, pedicels, and involucre.

Verbesina angusta Maguire, Steyermark & Wurdack, sp. nov.

Frutex 1–2-metralis simplex vel superne parce ramosus, caule atropurpureo vetustiore glabro tereti superne 5–8 mm diam., ramis superne primum hirtellis demum glabratis exalatis; foliis alternis erectis subtus pallido-viridibus petiolatis, petiolis 2–5 (–10) mm longis 2–3 mm latis, hirtellis vel glabrescentibus, laminis firmiter membranaceis oblanceolatis hebeti-acutis vel apiculatis basi cuneatis, 3–10 cm longis 0.7–2 cm latis crenulato-serrulatis (dentibus inter se 3–9 mm distantibus), supra in nervo mediano sparse strigosis alioqui glabris, subtus primum scaberulo-strigosis demum glabratis, penninerviis nervis lateralibus utroque 4–8 arcuato-adscendentibus 1–3 mm ante marginem anastomosantibus subtus prominulis; inflorescentia 4.5–9 cm elongata, corymbiformi-paniculata; paniculis terminalibus 3–8-capitulis; pedunculis atropurpureis gracilibus, 1.5–6 cm longis 0.5–1.5 mm latis, dense hirtellis; capitulis radiatis, disco 1–1.5 cm alto 1–1.5 cm lato; receptaculo late subhemisphaerico, 2.5 mm alto 4.5 mm diam.; involucro 2–3-seriato gradato, bracteis oblongis vel oblanceolato-oblongis rotundatis vel late obtusis, extimis 2 mm longis 1.2 mm latis, reliquis 4–5.5 (–8) mm longis 1–2 mm latis, extus basi marginibus sparse vel modice hirsutulis; radiis 7–13, aureis, laminis subelliptico-oblongis apice retusis tridentatis, 8.5–11 mm longis 3.7–4 mm latis, plerumque glabris nervis principalibus duobus nervis secundariis 7, tubo 1–1.7 mm longo 0.6–1 mm lato extus puberulo; corollis disci 39–45 luteis subcylindricis, 4.2–7 mm longis, quinquelobatis, lobis ovatis subacutis, 1–1.5 mm longis 0.75 mm latis, marginibus incrassatis hirtello-papillatis, tubo 3.2–5.5 mm longo basi infra mediumque 0.6–1 mm lato, supra medium 1–1.5 mm lato, infra medium hirsutulo aliter glabro; paleis fere complicatis late oblanceolatis vel spathulato-obovatis carinatis retusis rotundatis vel obtusis, 6–6.7 mm longis 1.8–2.5 mm latis, extus parce substrigosis, carina marginibusque modice vel dense hirtellis, leviter 4-striatis; filamentis ligulatis 1.2 mm longis 0.2 mm latis; antheris brunneis, 2.75–3.2 mm longis, sagittatis, appendicibus terminalibus ovato-oblongis obtusis 0.4 mm longis, caudicibus tenuibus rectis liberis, 0.2–0.3 mm longis; stylo 5 mm longo, bifido, ramis 1.8–2.2 mm longis, recurvatis ligulatis, appendice stigmatica ovata acuta extus dense pilosula; achaeniis brunneo-nigrescentibus compressis late oblongis vel obovatis, 3–4.8 mm longis 1.3–3 mm latis, prominenter alatis superficie parce strigillosa uno latere valde 1-costato, alis 0.3–0.6 mm latis, marginibus hispidulis supra medium praesertim eis achaeniorum disci basi angustatis latitudine achaeniorum radiorum extremorumque subaequalibus; aristis 2, inaequalibus minutissime setulosis, 2.5–3.2 mm longis.

TYPE: swampy savanna in depression along tributary valley of east branch of headwaters of Río Tirica, Central Section, Chimantá Massif, Bolívar, Venezuela, 2120 m alt., February 13, 1955, *Julian A. Steyermark & John J. Wurdack 851* (holotype NY, isotype F). Paratype: swampy depression in wet savanna along east branch of headwaters of Río Tirica, Central Section, Chimantá Massif, February 12, 1955, *Steyermark & Wurdack 816.*

V. angusta is closely related to *V. schomburgkii* Schultz- Bip., differing in the smaller, proportionately narrower leaves, sparser pubescence throughout, and generally fewer capitula in a relatively more elongated inflorescence.

Stenopadus chimantensis Maguire, Steyermark, & Wurdack, sp. nov.[29]

Frutex vel arbor 2–5–metralis, ramis novellis fulvo-tomentosis vetustioribus glabris; foliis alternis apice ramorum confertis petiolatis, petiolis incrassatis 4–7 mm longis 4–5 mm latis, fulvo-tomentosis demum glabrescentibus, laminis adscendentibus coriaceis supra atroviridibus subtus pallidioribus late obovatis vel subrotundato-obovatis, 7–15 cm longis 3–9 cm latis, leviter revolutis penninerviis, nervis lateralibus utroque latere 6–8 utrinque prominulis, costa media subtus elevata, novellis utrinque fulvo-strigillosis vetustioribus parce remoteque strigillosis vel glabrescentibus; capitulis solitariis apice ramorum sessilibus homogamis 22–44–floris; involucro late campanulato, 3.0–4.0 cm longo 2.5–3 cm lato ca. 6–8–seriato, phyllariis valde gradatis adpressis extus cinereo-ochroleuco-strigillosis, exterioribus coriaceis late ovatis vel oblongo-ovatis obtusis, 0.8–2.3 cm longis 0.6–0.8 cm latis, intimis chartaceis lanceolatis subacutis 3.2–3.4 cm longis 4–5 mm latis; receptaculo subplano alveolato 7 mm diam., alveolis parce adpresso-puberulis marginibus alveolarum glabris; paleis 4–5 chartaceis persistentibus subulato-setaceis, 3 cm longis 0.5 mm latis, apice extus hispidulis marginibus serrulato-hispidulis; floribus 22–44 subventricosis, actinomorphicis stramineis vel vinaceis; corollis 33 mm longis, glabris, tubo stramineo prismatico-cylindrico, (18) 20–25 mm longo 2.5 mm lato, lobis 5, vinaceis linearibus acutis, 17 mm longis 1 mm latis, valde revolutis; filamentis vinaceis, in sinibus affixis; antheris stramineis linearibus, 12.5 mm longis, appendicibus terminalibus triangularibus subacutis, 1 mm longis, caudicibus sagittatis lineari-lanceolatis falcato-acuminatis retrorse serrulatis; stylo 45 mm longo, scabrido-papilloso, ramis adpressis ab corona carnosa 1 mm longa subtentis; achaeniis fulvis vel atrobrunneis lineari-cylindricis 10-costatis, 9 mm longis 2 mm latis, pappo stramineo 3–5–seriato, ad 18 mm longo, hispidulo, longioribus apice dilatatis.

TYPE: on summit, at edge of escarpment in and among *zanjones*, Torono-tepuí, Chimantá Massif, Bolívar, Venezuela, 2165–2180 m alt., February 9, 1955, *Julian A. Steyermark & John J. Wurdack 652* (holotype NY; isotype F). Paratypes: around rocky ground, east-central portion of summit of Apácara-tepuí, Chimantá Massif, 2450–2500 m alt., June 21–22, 1953, *Steyermark 75875;* swampy depression in wet savanna along east branch of headwaters of Río Tirica, Central Section, Chimantá Massif, 2120 m alt., February 12, 1955, *Steyermark & Wurdack 787.*

Stenopadus affinis Maguire, Steyermark & Wurdack, sp. nov.

Arbor 10–12–metralis, ramis teretibus griseis juvenilibus parce strigosis vetustioribus glabris; foliis alternis petiolatis, petiolis 4–15(–35) mm longis 2–2.5 mm latis, parce strigillosis demum glabris, laminis patentibus chartaceo-coriaceis supra atroviridibus nitidis subtus pallido-viridibus elliptico-ovatis vel obovatis acutis vel obtusiusculis, 5–15 (–20) cm longis 2.5–6.5 cm latis, penninerviis utrinque prominenter reticulato-venosis, nervis lateralibus utroque latere 8–10 costa media subtus elevata, plerumque glabris, foliorum juvenilium costa media supra parce puberula excepta; capitulis solitariis terminalibus sessilibus homogamis 10–21-floris; involucro pyriformi basi angustato, 4–4.5 cm longo 1.5–2 cm lato, ca. 10-seriato, phyllariis valde gradatis adpressis extus fulvo-strigillosis, inferioribus coriaceis late ovatis obtusis vel acutiusculis, 10–13 mm longis 8–9 mm latis, superioribus oblongo- vel late lanceolatis acutiusculis vel acutis, 17–21 mm longis 5–7 mm latis, supremis linearibus vel lineari-lanceolatis, 25–30 mm longis 2–3 mm latis; receptaculo plano alveolato glabro, 5–6 mm diam. paleifero, paleis 3–4, chartaceis deciduis subulato-setaceis, 32–35 mm longis 1 mm latis, extus marginibusque hirsutulis; floribus 19–21 actinomorphicis albidis; corollis 32 mm longis glabris, tubo hypocrateriformi, 20–22 mm longo basi 1.5 mm lato apice 2.5 mm lato, quinquelobato, lobis subaequalibus anguste linearibus, 13–15 mm longis 1 mm latis, acuminatis valde revolutis apice marginibusque incrassatis; filamentis in sinibus affixis, 5–6 mm longis, antheris 11–11.5 mm longis, appendicibus terminalibus triangularibus acutiusculis 1 mm longis, caudicibus sagittatis, 2.5 mm longis, lineari-lanceolatis falcato-acuminatis remote retrorso-serrulatis; pappo 18–20 mm longo, sordido, setis 5–6-seriatis longioribus apice dilatatis hispidulis; achaeniis nigris lineari-cylindricis prismaticis 5–7-angulatis, 11 mm longis 2 mm latis, glabris.

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[29] A generic description and key to the species of *Stenopadus* is to be found in Mem. N. Y. Bot. Gard. 9:379, 380.

TYPE: common on forested west-facing slopes with sandstone boulders, between camp 2 and camp 3, northwestern part of Abácapa-tepuí, Chimantá-Massif, Bolívar, Venezuela, 850–1100 m alt., April 18, 1953, *Julian A. Steyermark 75410* (holotype F; isotype NY). Paratype: along southwest-facing sandstone bluffs of Chimantá-tepuí (Torono-tepuí), near southern corner, Chimantá Massif, 1700 m alt., May 19–20, 1953, *Steyermark 75479.*

Chimantaea Maguire, Steyermark & Wurdack, gen. nov.

Capitulis solitariis, terminalibus, majusculis, multifloris (20–50); phyllariis gradatis acutis, multiseriatis; receptaculo plano-convexo pubescenti; paleis paucis (2–5), marginalibus; corollis actinomorphicis, membraneis, tubo 5-nervato, intus ad sinus pilosis, lobis erectis vel recurvatis, plus minusve barbellatis, 2-nervatis, tubum excedentibus; filamentis in sinibus affixis, antheris sagittatis, appendicibus caudatis linearibus liberis; granis pollinis luteis tricolporatis sulcis longiacutis, prolatis vel prolato-sphaeroidiis, spinulosis, axibus polaris 50–55 μ longis; stylis sursum asperulis, ramis erectis brevibus indifferentiatis; achaeniis prismaticis 10-costatis, glabris vel pubescentibus; annulo deficienti; corona 5-partito-lobata, lobis saepe ad basim liberis; pappo 2–4-seriatis, setis inaequaliter longis, ad basim compressis, sursum barbellatis, ad apicem subgeniculatis, appendicibus aristatis.

Typus: *Chimantaea mirabilis* Maguire, Steyermark & Wurdack.

Key to the Sections and Species of Chimantaea

1. Heads not imbedded in woolly pubescence and apical leaves, the involucre exposed; leaves broadly oblanceolate; branched, thick-stemmed shrubs; sect. *Cinerea.*
    2. Achenes and receptacle densely villose or pilose; heads 2.5–3.5 cm long; phyllaries at length strongly recurved or reflexed. 1. *Chimantaea cinerea.*
    2. Achenes and receptacle glabrous; heads 3.5–4.0 cm long; phyllaries ascending, neither recurved nor reflexed. 2. *Chimantaea similis.*
1. Heads imbedded in copious woolly pubescence and apical leaves, the involucre partly or wholly obscured; sect. *Chimantaea.*
    3. Achenes and receptacle densely villose or pilose; leaves spreading or ascending, not marcescent.

4. Leaves broadly spathulate or cuneate, 3–4 cm broad, 6–7 cm long; stems remaining densely woolly-tomentose. 3. *Chimantaea lanocaulis.*
4. Leaves narrow, not exceeding 2 cm broad.
5. Leaves oblanceolate, 1.2–2.0 cm broad.
6. Heads almost completely immersed in woolly pubescence; phyllaries glabrous, merely hispidulous at the summit. 4. *Chimantaea eriocephala.*
6. Heads immersed in woolly pubescence only at the base; phyllaries densely red-tawny tomentose on the back. 5. *Chimantaea rupicola.*
5. Leaves narrowly elliptic-linear, 5–8 mm broad. 6. *Chimantaea humilis.*
3. Achenes and receptacle glabrous; old leaves strongly reflexed and marcescent on the stem.
7. Leaves narrowly linear, base of the upper leaves immersed in very copious and voluminous arachnoid tomentum. 7. *Chimantaea mirabilis.*
7. Leaves oblanceolate, base of the upper leaves imbedded in a compact subpannose tomentum. 8. *Chimantaea espeletoidea.*

Chimantaea sect. Cinerea Maguire, Steyermark & Wurdack, sect. nov.

Stenopadus subg. *Eriostenopadus* Blake, Brittonia 3: 201. 1939, as to type.

Frutex depressa; capitulis non in foliis supremis et copiosis tomentosis insessis; lobis corollarum tenue pilosis non-barbellatis.

Typus: *Chimantaea cinerea* (Gl. & Blake) Maguire, Steyermark & Wurdack.

1. **Chimantaea cinerea** (Gl. & Blake) Maguire, Steyermark & Wurdack, comb. nov.

Stenopadus cinereus Gleason & Blake, Brittonia 3: 200. 1939.

TYPE: *Tate 1111*, Auyán-tepuí, Gran Sabana, Venezuela, at 2200 m alt. (NY).

Distribution. Known only from Auyán-tepuí, and besides the type only by *Cardona 2717*. Reported by Cardona as a shrub to 3 m high with a resinous trunk, common on the cumbre at 2100–2500 m alt.

2. **Chimantaea similis** Maguire, Steyermark, & Wurdack, sp. nov.

Frutex vel arbor 2–5-metralis, ramis divaricatis paucibus teretibus juvenilibus, 1–1.5 cm diam.; foliis alternis apice ramorum confertis petiolatis, petiolis incrassatis vel alatis tomentosis, 2–4 (15)mm longis 5–8 mm latis vel laminis sessilibus, laminis coriaceis obovatis vel oblongo-obovatis apice rotundatis, 5.5–10 (15) cm longis (1.5) 2.5–6.0 (8.0) cm latis, revolutis supra glabris vel subglabris (costa tomentulosa excepta) subtus densissime cinereo-ochroleuco-pannoso-tomentosis penninerviis nervis lateralibus utroque latere 6–10 jugis subtus laminis vetustioribus prominulis laminis juvenilibus ficte nullis, costa media supra subsulcata subtus elevata; capitulis solitariis terminalibus sessilibus 25–30-floris homogamis; involucro late campanulato 10–12-seriato, 3.5–4.0 cm longo 1.2–1.5 cm lato, phyllariis indurato-chartaceis exterioribus 6–7-seriatis arcte gradatis anguste ovatis vel lanceolatis acuminatis, 7–16 mm longis 2–2.5 mm latis, supra media cinereo-tomentosis, interioribus 3–5-seriatis fulvis subito longioribus ante maturitatem erectis eis maturis laxe recurvatis linearibus vel subulato-setaceis cuspidato-acuminatis, 28–30 mm longis 1.25–1.5 mm latis, apice hispidulis extus dense papilloso-scabridulosis remote denticulato-ciliolatis; receptaculo 4–5 mm diam., alveolato alveolis cinereo-pilosulis marginibus alveolarum glabris; paleis 1–2 deciduis marginalibus chartaceis setaceo-subulatis, 29–30 mm longis 0.5–0.75 mm latis, apice extusque scabridulis vel hispidulis intus glabris; floribus actinomorphicis stramineo-viridibus, 22–25 mm longis, tubo prismatico-cylindrico, 6–8 longo 2 mm diam. extus glabro intus fauce pilis albis hirsutulo-barbato (in statu sico ficte pilis patentibus in speciem extus tantum intus unde), lobis 5 erectis linearibus apice subobtusis incrassato-cucullatis glabris, 16–18 mm longis 0.7–0.8 mm latis; filamentis filiformibus in orificio tubi affixis; antheris linearibus, 10.5–11 mm longis, appendicibus terminalibus late triangularibus acutiusculis, 0.5 mm longis, caudicibus sagittatis liberis inaequilateralibus lanceolatis subacutis, 1.3–1.4 mm longis; stylo pallido viridi, 43 mm longo papillato apice bifido extus scabridulo-papillato basi ab corona carnosa parce undulata 0.6–0.8 mm longa subtento; achaeniis lineari-turbinatis, 6–8 mm longis 2 mm latis, 10-costatis glabris; pappo stramineo-rufescenti, 23 mm longo, 3–4-seriato, setis barbellatis.

TYPE: open rocky places by savanna bordering escarpment below Summit Camp above Middle Falls near Río Tirica, Central Section, Chimantá Massif, Bolívar, Venezuela, 1925 m alt., February 5, 1955 *Julian A. Steyermark & John J. Wurdack 511* (holotype NY, isotype F.). Paratypes: at edge of escarpment, east-central portion of summit of Apácara-tepuí, Chimantá Massif, 2450–2500 m alt., June 21–22, 1953, *Steyermark 75922;* northwest cumbres, Churi-tepuí (Murú-tepuí), Chimantá Massif, 2300–2350 m alt., February 3, 1953, *Wurdack 34312 pp.*

Chimantaea sect. Chimantaea.

Virgate, little-branched or sometimes moderately branched shrubs; heads at the stem apex deeply immersed in the uppermost leaves, and a voluminous copious tomentum; corolla-lobes conspicuously barbellate, the tuft of long hairs often quickly deciduous.

TYPE: *Chimantaea mirabilis* Maguire, Steyermark & Wurdack.

3. Chimantaea lanocaulis Maguire, Steyermark, & Wurdack, sp. nov.

Frutex 1.5–2.0-metralis, caule erecto ligneo, 2 cm diam., simplici solitario infra denudato aliter apice conferte folioso, parte denudata plerumque glabra parte foliosa densissime ochroleuco-luteo-lanosa; foliis caulis parte suprema confertis alternis subsessilibus vel brevissime petiolatis, petiolis crassis 5–8 mm longis 5–7.5 mm. latis densissime ochroleuco-luteo-lanosis, laminis patentibus coriaceis cuneato- vel rhomboideo-obovatis rotundatis vel subtruncatis basi cuneatis, (4.5) 6–8 cm longis 3–5(7) cm latis, marginibus revolutis, penninerviis nervis lateralibus utroque latere 2–4 prominentibus supra sulcatis subtus elevatis supra oliveo-viridibus glabris vel glabrescentibus supremis juvenilibus irregulariter cinereo- vel ochroleuco-lanulosis subtus densissime ochroleuco-luteo-lanulosis; capitulis solitariis terminalibus sessilibus in foliis supremis et copiosis tomentis insessis 60–100-floris homogamis maturis distentis, 3–3.5 cm longis 5–5.5 cm latis, primum minoribus; involucro maturo distento late campanulato 5–6-seriato, phyllariis indurato-subcoriaceis 75–85 exterioribus medianisque late lanceolatis obtusis vel acutis ad 15 mm longis 5–6 mm latis basi ipsa densissime fulvo-tomentosis supra medium fulvo-tomentosis marginibus dense ciliato-hirsutis aliter glabris, interioribus intimisque lineari-lanceolatis acuminatis vel caudatis, 22–25 mm longis 2–2.5 mm latis, extus tomentosis basi ipsa excepta; receptaculo areolarum dense ferrugineo-hirsutulo pilis erectis; paleis non visis; floribus actinomorphicis; corollis 22–25 mm longis, tubo prismatico-cylindrico, 8–9 mm longo 1.5 mm diam., extus glabro intus fauce barbato-piloso, lobis fulvis erectis linearibus acutiusculis, 14–16 mm longis 0.75 mm latis, circa apicem rufo-barbatis; filamentis filiformibus in orificio tubi affixis; antheris pallido brunneis, 6–8 mm longis, glabris, appendicibus terminalibus triangulari-lanceolatis acutis, 1.0–1.5 mm longis, caudicibus sagittatis liberis lineari-subulatis, 1.5 mm longis, glabris; stylo subulato longe exserto, 3.1–3.8 cm longo, vinaceo, ramis subadpressis erectis, 0.7–1.0 mm longis, glabris, basi ab corona carnosa 5-lobata 1.5 mm alta subtento; achaeniis oblongo-turbinatis prismaticis, 7–8 mm longis, 10-costatis densissime fulvo-hirsutulis pilis sursum directis; pappo rufescenti 2–3-seriato, setis ad 19 mm longis, barbellatis, aristatis.

TYPE: east-central portion of summit of Apácara-tepuí, Chimantá Massif, Bolívar, Venezuela, 2450–2500 m alt., June 21–22, 1953, *Julian A. Steyermark 75912* (holotype F, isotype NY).

4. **Chimantaea eriocephala** Maguire, Steyermark & Wurdack, sp. nov.

Frutex depressus 0.2–0.5-metralis, caulibus simplicibus vel parce ramosis ligneis infra denudatis, ad 1.5–2.0 cm diam., apice conferte foliosis ferrugineo-lanulosis; foliis apice confertis alternis breviter subito petiolatis, petiolis 7–10 mm longis 2–3 mm latis, densissime fulvo-lanulosis pilis ad 2 cm longis, laminis coriaceis patentibus vel adscendentibus oblanceolatis rotundatis, 2.5–4.5 cm longis 1.0–1.8 cm latis, valde revolutis supra oliveo- vel fulvo-viridibus glabris sulcatis obscure nervatis subtus densissime fulvo-pannosis nervis lateralibus prominulis utroque latere 1–3, costa media subtus elevata; capitulis solitariis terminalibus sessilibus in foliis supremis et copiosis tomentis insessis 20–25-floris homogamis ad 3 cm latis; involucri phyllariis anguste lanceolatis acuminatis, ca. 23 mm longis 1.8 mm latis, extus per medium parce leviter strigosis intus glabris apice utrinque hispidulo excepto; floribus actinomorphicis; corollae tubo paullo prismatico-cylindrico, 5–6 mm longo 1.5 mm diam. extus, glabro intus fauce piloso lobis stramineis erectis linearibus acutis, 15–16 mm longis 0.5 mm latis, parce longiciliatis pilis 2–3 mm longis circa apicem barbatis pilis palidis; filamentis filiformibus in orificio tubi affixis; antheris non visis; stylo subulato basi ad corona carnosa 5-lobato 1 mm alta subtento; achaeniis cylindrico-turbinatis, 5.5–6.0 mm longis 2 mm latis, densissime stramineo-hirsutulis pilis sursum directis; pappo stramineo ca. 2–3-seriato, setis ad 20 mm longis 0.1–0.2 mm latis barbellatis, aristatis.

TYPE: upper cumbre and deep canos, northwest cumbres, Churi-tepuí (Murú-tepuí), Chimantá Massif, Bolívar, Venezuela, 2250–2300 m alt., January 26, 1953, *John J. Wurdack 34225* (NY).

5. Chimantaea rupicola Maguire, Steyermark & Wurdack, sp. nov.

Frutex depressus ramiferus 0.1–0.3-metralis, caulibus ramisque irregulariter curvatis ligneis rugosis, ad 4 cm diam., infra denudatis apice conferte foliosis, ferrugineo- vel pallido-brunneo-pannosis vel vetustioribus glabris; foliis apice confertis sessilibus alternis coriaceis patentibus vel adscendentibus oblanceolatis obtusis vel rotundatis, 3–6 cm longis 0.6–1.5 cm latis, valde revolutis supra oliveo-viridibus penninerviis nervis lateralibus utroque latere 2–4 glabris vel supremis juvenilibus cinereo-pannosis subtus vetustioribus densissime cinereo-pannoso-tomentosis juvenilibus ferrugineo-pannoso-tomentosis; capitulis solitariis terminalibus sessilibus in foliis et copiosis tomentis supremis insessis homogamis, primum 2–2.5 cm longis 1–1.3 cm latis, maturis distentis ad 2.8 cm longis ad 3.5 cm latis; involucro oblongo-campanulato ca. 8-seriato, phyllariis 50–55 indurato-chartaceis extus supra medium densissime ferrugineo-tomentosis intus glabris exterioribus medianisque lanceolatis acutis, 6–12 mm longis 2–3 mm latis, interioribus 18–22 mm longis 1.5–2 mm. latis; receptaculo plano vel plano-convexo ca. 2.5 mm diam. valde alveolato marginibus areolarum ferrugineo-hirsutulis; paleis 1–2 deciduis marginalibus submembranaceis setaceo-subulatis, ad 25 mm longis 0.2 mm latis, marginibus parce barbellato-hispidulis extus supra medium ferrugineo-pilosis; floribus 12–24 actinomorphicis; tubo paullo prismatico-cylindrico, 6 mm longo 2 mm diam., extus glabro intus fauce piloso; lobis luteis erectis linearibus obtusis marginibus incrassatis, 12–16 mm longis 0.5–0.8 mm latis, parce longiciliatis extus circa apicem rufo-barbatis; filamentis filiformibus in orificio tubi affixis; antheris ochroleucis linearibus, 5.5–6.5 mm longis, glabris, appendicibus terminalibus lanceolatis acutis, 1.2 mm longis, caudicibus sagittatis liberis linearibus, 1–1.3 mm longis, glabris; stylo subulato longe exserto, 3–3.3 cm longo, superne luteo, ramis erectis, 0.6–0.7 mm longis, glabris, basi ab corona carnosa 5-lobata 1–1.2 mm alta subtento; achaeniis oblongo-turbinatis prismaticis, 5–6 mm longis, 10-costatis densissime ferrugineo-hirsutulis pilis sursum directis vel interdum sterilibus glabris; pappo rufescenti 3-seriato, setis ad 18 mm longis, 0.05–0.25 mm latis, barbellatis, appendicum apicibus geniculatis ca. 1 mm longis.

TYPE: rocky and swampy savanna between west and east branches of headwaters of Río Tirica, Central Section, Chimantá Massif, Bolívar, Venezuela, 2120–2210 m alt., February 11, 1955, *Julian A. Steyermark & John J. Wurdack* *748* (holotype NY, isotype F).

6. **Chimantaea humilis** Maguire, Steyermark & Wurdack, sp. nov.

Frutex 0.1–0.3-metralis, caule erecto ligneo 0.8–1 cm diam. simplici solitario conferte folioso fulvo-lanoso; foliis supremis patentibus aliis reflexis, alternis subsessilibus basi angustatis coriaceis supra olivaceo-viridibus subtus pallide fulvis anguste spathulatis vel lineari-ellipticis rotundatis, 4.0–6.0 cm. longis 5–8 mm. latis, valde revolutis supra convexis canaliculatis supremis juvenilibusque supra minutissime scabridulis subtus cano-tomentulosis; capitulis terminalibus solitariis sessilibus homogamis in foliis supremis et copiosis tomentis insessis in statu sicco campanulatis; floribus actinomorphicis 20 vel paucioribus extus glabris, 23–24 mm longis, tubo prismatico-cylindrico, 7–8 mm longo 1.8 mm diam., extus glabro intus fauce barbato-piloso, lobis 5 erectis linearibus acutiusculis marginibus incrassatis, 14–16 mm longis 0.7 mm latis, glabris apice incrassato incurvato; filamentis filiformibus in orificio tubi affixis; antheris linearibus, 8.5 mm longis, glabris, appendicibus terminalibus late triangularibus acutiusculis, 0.5 mm longis, caudicibus sagittatis liberis spathulatis apicibus late rotundatis; stylo basi ab corona carnosa 5-lobata 1.2 mm alto subtento; achaeniis anguste cylindrico-turbinatis prismaticis, 8–9 mm longis superne 2–3 mm latis, 10-costatis fulvo-velutinis pilis sursum directis; pappo stramineo-brunneo vel rufescenti, ad 18 mm longo, 3–4-seriato, setis barbellatis, aristatis.

TYPE: dry rocky places on rocky and swampy savanna between west and east branches of headwaters of Río Tirica, Central Section, Chimantá Massif, Bolívar, Venezuela, 2120–2210 m alt., February 11, 1955, *Julian A. Steyermark & John J. Wurdack* 747 (holotype NY, isotype F).

7. **Chimantaea mirabilis** Maguire, Steyermark, & Wurdack, sp. nov.

Frutex 0.5–3.0-metralis, caule erecto ligneo ad 5 cm diam. plerumque simplici solitario interdum apice bifurcato infra denudato aliter conferte folioso, parte denudata glabra, parte foliosa stramineo-lanulosa; foliis congestis sessilibus supremis erecto-patentibus vetustioribus inferioribusque reflexis, coriaceis marginibus valde revolutis supra oliveo-viridibus supremis pilis longissimis densis cremeo-stramineis lanulosis praeditis tandem plerumque deciduis vetustioribus glabris, subtus ochroleuco-pannosis, subteretibus linearibus vel lineari-subulatis praeter basim ipsam ampliatam chartaceam obtusis basi ampliatis, 5–8 cm longis 3.5–5 mm latis, basi ipsa 12–15 mm lata, supra canaliculatis basi ampliata 5-nervatis; capitulis terminalibus solitariis sessilibus 45–50-floris homogamis in foliis supremis et copiosis tomentosis insessis in statu vivo ovoideo-cylindricis in statu sicco campanulatis; eis maturis distentis, 4.5–5 cm longis 2–4 cm latis, eis ante maturitatem 3–4.5 cm longis 12–20 mm latis; involucro ca. 5-seriato, phyllariis 90–100, ante maturitatem erectis, eis maturis squarrosis vel laxe recurvatis, indurato-chartaceis, extimis medianisque ovato-lanceolatis vel lineari-lanceolatis acuminatis, 14–18 mm longis infra medium 2–3 mm latis, intus glabris extus circa apicem parce pilosulis superne minute hispidulis vel strigillosis aliter glabris, marginibus eroso-serrulatis, intimis lineari-lanceolatis vel linearibus, 20–34 mm longis 1–2 mm latis, extus superne dense pilosis vel lanulosis; receptaculo plano-convexo, ca. 6 mm diam., alveolato glabro; paleis 2–5 deciduis marginalibus extus parce pilosis marginibus superne hispidulis; floribus actinomorphicis extus glabris, 24–25 mm longis, aurantiacis et stramineo-brunneis, tubo stramineo-brunneo paullo prismatico-cylindrico, 9–10 mm longo 1.5–2 mm diam., extus glabro intus fauce piloso, lobis aurantiacis vel stramineis 5, erectis in statu sicco apice recurvatis linearibus acutis marginibus incrassatis, 15–17 mm longis 0.6–0.8 mm latis, circa apicem puberulis marginibus ciliatis pilis rufis 1–3 mm longis praeditis; filamentis filiformibus in orificio tubi affixis, 16–18 mm longis; antheris brunneo-stramineis vel aurantiacis linearibus, 7.5–8.5 mm longis, glabris, appendicibus terminalibus anguste triangularibus 1 mm longis, caudicibus sagittatis liberis inaequilateralibus subulatis, 0.7–1.3 mm longis; stylo aurantiaco vel aureo, 35–42 mm longo 1 mm crasso, apice bifido extus subscabridulo-papillato basi ab corona carnosa 5-lobata 1–1.3 mm alta subtento; achaeniis lineari-turbinatis prismaticis, 7–8.5 mm longis superne ad 2 mm latis, plerumque 12-costatis fulvo-velutinis aetate parte inferiore glabrescentibus; pappo stramineo-brunneo, 20–22 mm longo basi 0.2–0.3 mm lato, 3–4-seriato, setis barbellatis.

TYPE: swampy savanna in depression below ridge west of west branch of headwaters of Río Tirica, Central Section, Chimantá Massif, Bolívar, Venezuela, 2120 m alt., February 13, 1955, *Julian A. Steyermark & John J. Wurdack 821* (holotype F, isotype NY). Paratypes: thickets bordering savanna below Upper Falls of Río Tirica above Summit Camp, Central Section, Chimantá Massif, 1940 m alt., February 7, 1955, *Steyermark & Wurdack 605*; dominant in large swamp, east-central portion of summit of Apácara-tepuí, Chimantá Massif, 2450–2500 m alt., June 21–22, 1953, *Steyermark 75923*.

8. **Chimantaea espeletoidea** Maguire, Steyermark, & Wurdack, sp. nov.

Frutex 2–3-metralis, caule erecto ligneo 1.5–2 cm diam. simplici solitario infra denudato aliter conferte folioso, parte denudata cano-tomentosa vel glabra, parte foliosa cano-tomentosa; foliis supremis congestis adscendentibus vetustioribus patentibus alternis petiolatis, petiolis crassis, 1–2 cm longis 1–1.3 cm latis, basi ampliatis utrinque cano-lanosis vetustioribus tomentellis, laminis coriaceis supra atroviridibus glabris vel subglabris subtus ochroleucis dense tomentosis vel vetustioribus cano-tomentosis anguste elliptico-lanceolatis obtusis, 6–10 cm longis 1–2 cm latis, supra sulcatis nervis lateralibus obscuris valde revolutis; capitulis solitariis terminalibus sessilibus in basi lanosa foliorum supremorum et copiosis tomentosis insessis 25–35-floris homogamis maturis distentis, 3.5 cm altis 5.5 cm latis; involucro maturo distento late campanulato 5–6-seriato, phyllariis 75–80, maturis squarrosis vel laxe recurvatis indurato-chartaceis, extimis medianisque late lanceolatis acuminatis, 10–12 mm longis 2.5–3 mm latis, intus glabris extus cano-tomentosis, interioribus intimisque linearibus vel subulatis acuminatis vel caudatis, 30–32 mm longis 1.8–2 mm latis, supra medium ochroleuco-tomentosis intus glabris; receptaculo profunde concavo, 4.5–5 mm diam., areolis parce cano-tomentellis; paleis 3–4, deciduis marginalibus chartaceis subulatis, 30–31 mm longis 0.8–0.9 mm latis, extus medium supra parce pilosis intus glabris; floribus actinomorphicis extus glabris, 26 mm longis, tubo prismatico-cylindrico, 9 mm longo 1.5 mm diam., extus glabro intus fauce dense hirsutulo, lobis pallide luteis 5, erectis apice recurvatis linearibus acutiusculis marginibus incrassatis, 17–18 mm longis 0.7–0.8 mm latis, parce ciliolatis apice

cano-barbatis; filamentis filiformibus vinaceis in orificio tubi affixis, 16–17 mm longis; antheris linearibus, 9.5–10 mm longis, glabris, appendicibus terminalibus triangularibus acutis, 0.6–0.7 mm longis, caudicibus sagittatis liberis subulatis acutis, 1.7–1.8 mm longis; stylo papillato luteo, 43 mm longo apice bifido; achaeniis lineari-turbinatis, 8–9 mm longis ad 2 mm latis, 12-costatis glabris; pappo stramineo vel rufescenti, ad 22 mm longo, 3–4-seriato, setis barbellatis.

TYPE: thickets bordering savanna below Upper Falls of Río Tirica above Summit Camp, Central Section, Chimantá Massif, Bolívar, Venezuela, 1940 m alt., February 7, 1955, *Julian A. Steyermark & John J. Wurdack 574* (holotype F, isotype NY).

Quelchia N. E. Brown, Trans. Linn. Soc. Lond. II. Bot. 6: 41. 1901.

Inflorescencex loosely or compactly glomerate, axillary; heads uniflorous; involucre small, cylindric, phyllaries 8–12; corolla regular, thin-textured, the lobes and tube subequal, the first 2-veined, the tube 5-veined, the lobes recurved; filaments short, attached in the sinus; caudal appendage of the anthers sagittate, connate except at the tip; pollen grains yellowish, tricolporate, furrows long pointed; grains subprolate to prolate, sphaeroidal, spinulose; polar axis 50–55 μ; style glabrous, bulbous at the base, the branches moderately long (1.5–1.75 mm), recurved, dilated compressed, bluntly 3-lobed at the apex, the marginal stigmatic lines obvious; achene fusiform, 10-nerved, annulate at the base, the disk at the summit broader than the body; corona 2–3 mm long, entire; pappus 3–4-seriate, the setae filamentous, flattened at the base, barbellate.

Branched or virgate shrubs with alternate net-veined leaves and malpighioid pubescence. A genus of four species and one recognized hybrid population. Confined to the mesitas of the Roraima chain and Chimantá-tepuí.

TYPE species: *Quelchia conferta* N. E. Brown.

Key to the Species of Quelchia

1. Inflorescences pedunculate; stems closely or densely sericeous; corollas white.
  2. Leaves oblanceolate or oblong-oblanceolate; petioles 1.5–2.5 cm long; peduncles 4–8 cm long.
    3. Leaves oblanceolate to elliptic-obovate, 3–7 cm long, acute or acuminate at the base; upper phyllaries glabrous on the back; corollas 10–11 mm long. 1. *Quelchia conferta.*
    3. Leaves oblong-oblanceolate to oblong, 6–12 cm long, obtuse or acute at the base; all phyllaries tomentose on the back; corollas 12–14 mm long. 2. *Quelchia cardonae.*
  2. Leaves broadly elliptic to oblong-obovate, 4–6 cm long; petioles ca. 5 mm long; peduncles 1–3 cm long; phyllaries glabrous on the back, scantily pilose at the apex; corollas 9–10 mm long. 3. *Quelchia bracteata.*
1. Inflorescences sessile; stems copiously lanate or tomentose; corollas red or pink.
  4. Virgate unbranched shrub; leaves elliptic-oblong, oblong or obovate, 4–6 cm long, 2.5–4 cm broad, copiously lanate-tomentose beneath. 4. *Quelchia eriocaulis.*
  4. Virgate shrub, branched above; leaves obovate to elliptic-obovate, 6–10 cm long, 4–6 cm broad, thinly tomentose becoming more or less glabrescent 5. X *Quelchia grandifolia.*

1. **Quelchia conferta** N. E. Brown, Trans. Linn. Soc. II. Bot. 6:41. 1901.

TYPE: summit of Mt. Roraima 8600 ft, *McConnell & Quelch 652* (Kew).

Distribution. Originally collected on Mt. Roraima, Gran Sabana, Edo. Bolívar, Venezuela. More recent collections from Roraima are: *Tate 384; Pinkus 112; Steyermark 58801, 58840;* and from Ilú-tepuí north of Roraima: *Maguire 33428.*

A shrub 1–4 m high, of cumbre elfin Woodland, of the Roraima chain, occurring above 2000 m altitude.

2. **Quelchia cardonae** Steyermark, Fieldiana 28:670. 1953.

TYPE: cumbre, Cerro Acopán-tepuí at 2200 m alt., October 1947, *F. Cardona 2288* (US No. 19322272).

Distribution. Known only from Acopán-tepuí, Gran Sabana, Edo. Bolívar, Venezuela, where it is an occasional tree of openings and elfin woodlands. Additional specimens, Chimantá Massif: *Steyermark & Wurdack 403, 565, 1007.*

3. **Quelchia bracteata** Maguire, Steyermark & Wurdack, sp. nov.

Frutex 2–4-metralis, caule erecto ligneo, ramulis erectis infra denudatis aliter conferte foliosis, 0.4–0.7 cm diam., parte media supraque stramineo-tomentosa infra strigoso, pilis malphigio-pauciramosis, foliis alternis densissime confertis erectis breviter petiolatis, petiolis incrassatis, 3–7 mm longis basi 2.5–4 mm latis, pubescentibus vel glabrescentibus, laminis coriaceis supra atroviridibus subtus argenteo-viridibus utrinque valde reticulato-venosis late oblongis vel obovato-oblongis rotundatis vel obtusis apiculatis basi subcordatis vel subobtusis, 3–8 cm longis 1.5–3.5 cm latis, costa media subtus prominenti, nervis lateralibus utroque latere 8–9; capitulorum glomerulis axillaribus, saepe pseudo-terminalibus dense confertis numerosis pedunculatis, pedunculis 0.3–3 cm longis, plerumque strigosis; corymbis 2–2.5 cm latis; capitulis congestis unifloris, 17–21 mm longis cum bracteis foliosis vel lanceolatis acutis vel subacutis, 12–17 mm longis 3–10 mm latis, strigillosis vel supra glabrescentibus subtendentibus; involucro fusiformi-elliptico, 9–12 mm longo 3–4 mm lato, 4–5-seriato, phyllariis 7–9 chartaceo-coriaceis lanceolatis extimis apice acutis vel subobtusis, 8–9 mm longis 2–2.5 mm latis, apice ciliatis extus circa apicem leviter pilosis, medianis intimisque apice obtusis vel subobtusis, 7.5–9 mm longis 2.5 mm latis, apicibus marginibusque parte superiore ciliolatis aliter glabris; corollis albidis actinomorphicis glabris profunde 5-fidis tubo cylindrico 3.5–4.0 mm longo 1.2 mm lato, lobis valde recurvatis linearibus acutis, 6 mm longis 1 mm latis; antheris atropurpureis, 6–6.25 mm longis, basi caudato-sagittatis, appendicibus terminalibus triangulari-lanceolatis acutis, 1.5 mm longis, caudicibus lineari-lanceolatis, 1.5–2.0 mm longis, acutiusculis hispidulis adjacentibus connatis; styli ramulis albidis divaricatis, ca. 1.75 mm longis, minute 3-lobatis; achaeniis subfusiformi-oblongis griseis vel brunneo-purpureis, 4–5 mm longis 1.5 mm latis, leviter 10-costatis glabris; pappo stramineo vel purpureo, vel supra stramineo et basi purpureo, 7–8 mm longo, setis scabridulis.

TYPE: forested slopes below summit of western escarpment, Torono-tepuí, Chimantá Massif, Bolívar, Venezuela, 1970 m, February 9, 1955, *Julian A. Steyermark & John J. Wurdack 683* (holotype NY, isotype F). Paratypes: rocky slopes around zanjones between east and west branches of headwaters of Río Tirica, Central Section, Chimantá Massif, 2185 m alt., February 12, 1955, *Steyermark & Wurdack 754* (putative parent of × *Q. grandifolia*); *Bonnetia forest,* northwestern part of summit of Abácapa-tepuí, Chimantá Massif, 2125–2300 m alt., April 13, 1953, *Steyermark 74872.*

4. **Quelchia eriocaulis** Maguire, Steyermark & Wurdack, sp. nov.

Frutex 1–3-metralis, caule erecto ligneo simplici solitario infra denudato aliter conferte folioso, parte media supraque densissime ferrugineo-lanulosa infra tomentoso vel glabrescenti, 0.7–1.2 cm diam.; foliis alternis densissime confertis breviter petiolatis, petiolis incrassatis, 0.7–1.5 cm longis, densissime

fulvo-lanulosis, laminis valde patentibus coriaceis supra atroviridibus glabris obscure vel valde reticulato-venosis subtus densissime fulvo-lanatis oblongo-obovatis vel ovato-oblongis rotundatis vel subobtusis apiculatis basi subcuneatis vel rotundatis, 2–9 cm longis 1–4.5 cm latis, caulium sterilium foliis majoribus ad 12 cm longis ad 5.5 cm latis, costa media supra subsulcata, nervis lateralibus primariis utroque latere 4–12, supra obscuris subtus nullis; capitulorum glomerulis axillaribus dense confertis numerosis inter folia per caulem; capitulis congestis sessilibus unifloris anguste subhemisphaericis vel late fusiformibus, 1.5–2 cm longis 1–2 cm latis, cum bracteis subulatis vel lineari-lanceolatis 11–23 mm longis 1–2 mm latis extus densissime ferrugineo-lanulosis intus glabris subtendentibus; involucro elliptico-ovato vel lanceolato, 2 cm longo 5–6 mm lato, 4–5-seriato, phyllariis 7–9–(10), extimis ovatis vel ovato-lanceolatis abrupte acuminatis, 7–8–(10) mm longis 4 mm latis, extus rufo-pubescentibus vestioribus glabris, medianis late lanceolatis abrupte acutis, ca. 10 mm longis 4 mm latis, parte superiore tertia rufo-pubescentibus vestustioribus glabris, intimis oblanceolatis vel lanceolatis subacutis vel subobtusis, 10–12 mm longis 2–3 mm latis, parte superiore quarta rufo-pubescentibus vetustioribus glabris; corollis rosaceo-rubris regularibus (actinomorphicis), 10–15 mm longis, cylindricis profunde 5-lobis, tubo 6–7 mm longo 1.5–2.5 mm diam. extus puberulo, lobis late lanceolatis acutis, 6–7 mm longis 1.25 mm latis, glabris; antheris 5.5–7 mm longis, basi caudato-sagittatis, appendicibus terminalibus triangulari-lanceolatis subacuminatis glabris, 1 mm longis, caudicibus lanceolatis vel lineari-oblongis subobtusis, 1.5–2.5 mm longis, hispidulis adjacentibus per 0.75–1 mm connatis; styli ramulis subtruncatis apice minute 3-lobatis, 1.5 mm longis, glabris; achaeniis subelliptico-oblongis castaneis, 5 mm longis 1.0–1.5 mm latis, 10-costatis glabris; pappo stramineo, 6–8 mm longo, setis scabridulis.

TYPE: summit, at edge of escarpment in and among zanjones, Torono-tepui, Chimantá Massif, Bolívar, Venezuela, 2165–2180 m alt., February 9, 1955, *Julian A. Steyermark & John J. Wurdack 675* (holotype F, isotype NY). Paratypes: east-central portion of summit of Apácara-tepuí, Chimantá Massif, 2450–2500 m alt., June 21–22, 1953, *Steyermark 75902;* rocky slopes around zanjones between east and west branches of Río Tirica, Central Section, Chimantá Massif, 2185 m alt., February 12, 1955, *Steyermark & Wurdack 753* (putative parent plant of × *Q. grandifolia*).

5. × **Quelchia grandifolia** Maguire, Steyermark, & Wurdack, hybrida nov.

Frutex 2–3-metralis, caule erecto ligneo simplici solitario infra denudato aliter conferte folioso, parte media supraque densissime rufo-lanulosa, 1–1.2 cm diam.; foliis alternis densissime confertis patentibus vel adscendentibus breviter petiolatis, petiolis incrassatis, 0.5–1 cm longis, densissime rufo-lanulosis, laminis coriaceis late oblongis vel obovato-oblongis rotundatis basi obtusis supra atroviridibus lucidis subtus argenteo-viridibus vel ferrugineis supra glabris praeter costam mediam basi tomentosam subtus tomentosis novellis dense velutinis, 7–10.5 cm longis 3–6 cm latis, utrinque reticulato-venosis nervis lateralibus utroque latere 7–8; capitulorum glomerulis subsessilibus plerumque in axillis foliorum superiorum; capitulis congestis sessilibus unifloris subhemisphaericis cum bracteis foliosis extimis ovatis 1.5 cm longis 1 cm latis subtus brunneo-velutinis, intimis subulatis vel lineari-lanceolatis extus ferrugineo-tomentosis praeditis; involucro oblongo-lanceolato, 12–13 mm longo 5–6 mm lato, phyllariis 9 chartaceis extus supra medium ferrugineo-lanulosis et extimis ciliolatis aliter glabris, extimis ovatis vel ovato-lanceolatis acutis vel acuminatis 6.5–7 mm longis, medianis intimisque ovato-lanceolatis vel lanceolatis subacutis vel obtusis 10–12 mm longis extus circa apicem laxe ferrugineo-lanulosis aliter glabris, corollis rosaceis; achaeniis 5–6 mm longis, glabris; pappo 7.5–8 mm longo, plerumque purpureo.

TYPE: rocky slopes around zanjones between east and west branches of headwaters of Río Tirica, Central Section, Chimantá Massif, Bolívar, Venezuela, 2185 m alt., February 12, 1955, *Julian A. Steyermark & John J. Wurdack 756* (holotype F). Paratypes: same data as above, *Steyermark & Wurdack 755* (NY); east central portion of summit of Apácara-tepui, Chimantá Massif, 2450–2500 m alt., June 21–22, 1953, *Steyermark 75913* (F, NY).

Gongylolepis fruticosa Maguire, Steyermark & Wurdack, sp. nov.

Frutex 0.2–0.5-metralis, ramis divaricatis glabris denudatis, caulibus juvenilibus subincrassatis glabris, 2.5–4 mm diam., internodiis 5–10 mm longis; foliis subtus pallide viridibus coriaceis apice caulium principalium rosulato-confertis sessilibus patentibus oblanceolatis acutiusculis vel subobtusis sensim ad basim cuneatis, 4–6 cm longis 1.5–2 cm latis, glabris basi ipsa dilatata excepta strigosis, subtus sulcatis parce penninerviis nervis lateralibus inconspicuis utroque latere 3–4, subtus valde reticulato-venosis costa media prominenti, foliis caulium juvenilium elongatorum alternis adscendentibus paullo minoribus omnino glabris; capitulis solitariis campanulatis terminalibus sessilibus, ca. 2 cm longis 1.3 cm latis; phyllariis firmiter membranaceis 12–18 gradatis 5-seriatis ciliolatis apice subscariosis, exterioribus late ovatis apice rotundatis, 4–9 mm longis 5–6 mm latis, medianis interioribusque angustate oblongis vel oblanceolatis apice rotundatis, 12–16 mm longis 3–5 mm latis; receptaculo subplano paullo alveolato, ca. 4 mm diam. medio pilis paucibus albidis 0.5–1 mm longis praeditis aliter glabro epaleaceo; floribus ca. 10, bilabiatis homogamis, corollis albidis, 18–19 mm longis, tubo infundibuliformi, 8 mm longo, extus puberulo, lobo posteriore (exteriore) elliptico-oblongo, 11 mm longo 5 mm lato, glabro 3-dentato dentibus ovato-oblongis obtusis ad 1.5 mm longis 0.6 mm latis duobus minoribus, lobo anteriore (interiore) 2-partito, segmentis linearibus subacutis valde revolutis 8.5 mm longis 0.5–0.8 mm latis glabris; antheris purpureis, 7.5 mm longis, caudicibus linearibus subacutis, 2 mm longis, liberis; filamentis in orificio tubi affixis; stylo ramulis divaricatis apicibus rotundatis recurvatis; pappo fusco-stramineo, 11 mm longo, adscendenti barbellato; achaeniis immaturis nigrescenti-fuscis, 7.5–8 mm longis, glabris, annulo brevissimo.

TYPE: edge of plunge basin of waterfall, southeast-facing forested slopes below escarpment, Agparamán-tepuí, Chimantá Massif, Bolívar, Venezuela, 1880–1955 m alt., February 26, 1955, *Julian A. Steyermark & John J. Wurdack 1136* (holotype, NY; isotype, F).

Known only from the type locality, *G. fruticosa* represents the ultimate reductive stage in *Gongylolepis* as it is known at this time. Habitally it is similar to the next, and suggests the evolutionary line through which the monotypic genus *Achnopogon* may have been derived.

G. fruticosa belongs to the subsection *Erioclada,* in which it seems to be most closely related to *G. erioclada,* but differs most obviously in its lack of pubescence and narrowly oblanceolate leaves, which in the latter species are elliptic or obovate and non-cuneate.

Achnopogon Maguire, Steyermark & Wurdack, gen. nov.

Capitula parva, in cymis lateralibus dispositis, 3–5-floris, homogamis, floribus bilabiatis; involucro campanulato-cylindrico; phyllariis nonnihil gradatis, obovatis vel oblanceolatis, coriaceis, ad apicem valde barbatis; receptaculo hemisphaerico, parvo, valde hirsuto, nonalveolato; corollis parvis submembranaceis bilabiatis, tubo cylindrico 5-nervato, limbo longiore, campanulato, lobo posteriore 4-nervato, minute tridentato, lobo anteriore profunde bifido, segmentis linearibus circinnatis 2-nervatis; antheris caudatis, appendicibus apicalibus acutiusculis, appendicibus caudalibus linearibus, integris, liberis; granis pollini luteis, tricolporatis, sulcis longiacutis; granis sphaeroideis, spinulosis, axibus polaribus ca. 52 μ; achaeniis cylindrico-fusiformibus, aliquantulum 10 (12)-costatis; annulis prominentibus, corona perbrevi, minute 5-lobata, collare pappifero non evidenti, pappo pluriseriato (5) tortili, setis filiformibus minute barbellatis; stylo filiformi laevi; ramis adscendentibus vix exsertis, dorso unilobatis, partibus stigmatibus projectis minutissimis.

Frutex parvus; trunculo brevi, ramis non ramosis; foliis alternis sessilibus confertis coriaceis, penninerviis reticulatis, ellipticis vel elliptico-oblanceolatis.

Genus monotypicum.

TYPUS: *Achnopogon virgatus* Maguire, Steyermark & Wurdack.

Achne (″αχνη), chaff; pogon (πώγων), beard.

Achnopogon virgatus Maguire, Steyermark & Wurdack, sp. nov.

Frutex 0.3–0.6–metralis, caule principali cinereo erecto, 2–12 cm longo 7–12 mm diam., apice cinereo-tomentello aliter glabro, ramis lateralibus simplicibus vel interdum ramosis arcuato-adscendentibus gracilibus, 2–3 mm diam. basi ad 5 mm diam. 2–6 dm altis, cano-pubescentibus vel glabrescentibus; foliis coriaceis apice caulis principalibus vel caulium lateralium brevium rosulato-confertis sessilibus vel breviter petiolatis, laminis subtus pallido-viridibus anguste elliptico-lanceolatis vel oblanceolatis acutiusculis apiculatis vel obtusis, 2–6 cm longis 6–12 mm latis, subtus leviter penninerviis nervis lateralibus utroque latere plerumque 10–12 valde reticulato-venosis supra nervis obscuris vel nullis, irregulariter pilosis vel glabrescentibus, costa media prominenti, supra canaliculata subtus prominenti, marginibus valde nervatis, foliis caulium floriferum lateralium erecto-adscendentibus alternis plerumque breviter petiolatis, petiolis 3–5 mm longis 1.5–2 mm latis, laminis oblongo-lanceolatis vel elliptico-oblongis acutis vel acuminatis apiculatis, 1.5–2.5 cm longis 4–9 mm latis, subtus leviter penninerviis nervis lateralibus utroque latere 4–7 valde reticulato-venosis supra nervis obscuris vel nullis dense vel parce pilosis; inflorescentiis lateralibus in axillis foliorum superiorum in cymis dispositis breviter pedunculatis; capitulis 2–3 in cyma, campanulato-cylindricis, 10–15 mm longis 4–5 mm latis, homogamis 4–6–floris; phyllariis 15–20, firme chartaceis vel apice subcoriaceis ca 5-seriatis aequaliter gradatis adpressis, 5–9–striatis, extremis ovatis vel lanceolatis acutis, 3–5 mm longis 0.8–1.6 mm latis, extus omnino cano-hirtellis intus glabris, medianis oblanceolatis vel obovatis acutis, 6–7 mm longis 2–3 mm latis, extus apice et parte suprema cano-barbatis pilis erectis infra medium intusque glabris, intimis supremisque oblanceolatis acutis, 9–10.5 mm longis 1.5–2.0 mm latis; receptaculo hemisphaerico, 0.6–0.9 mm diam., apice hirsutis pilis erectis 2–4 mm longis; corollis bilabiatis, 8.0–8.5 mm longis, tubo cylindrico, 3–3.5 mm longo 0.4–1.5 mm diam., extus supra basim minute puberulo, limbo 5 mm longo, lobo posteriore (exteriore) intus albido extus albido-lilacino apice purpureo, 4–5 mm longo, 3-dentato lobis ovatis obtusis 0.2–0.3 mm longis, lobo anteriore (interiore) 2-partito, lobis albidis ligulatis acutiusculis valde revolutis, 3–4 mm longis 0.5–0.6 mm latis; filamentis ca. 0.5 mm longis, in orificio tubi affixis; antheris vinaceis, 3.75–4.0 mm longis, appendicibus terminalibus ovatis subacutis, 0.5–0.6 mm longis, caudicibus simplicibus non sagittatis linearibus subacutis, 1.0–1.2 mm longis, liberis; stylo vix vel non exserto ramulis recurvatis late obtusis truncatis 1.2–1.4 mm longis, dorso unilobato, parte stigmatica 0.2–0.3 mm projecta; pappo stramineo vel rufescenti-stramineo curvato, 6.0–6.5 mm longo, setis numerosis ca. 5-seriatis minute adscendenti-barbellatis; achaeniis stramineis fusiformibus, 5–6 mm longis 1.0–1.5 mm diam., 10-nervatis glabris, annulo brevissimo, corona perbrevi, minute 5-lobata.

TYPE: savanna below summit of western escarpment, Torono-tepuí, Chimantá Massif, Bolívar, Venezuela, 2090 m alt., February 9, 1955, *Julian A. Steyermark & John J. Wurdack 681* (holotype F, isotype NY). Paratypes: prominent exposed sandstone formations around swampy savannas on plateau of southeast-facing upper shoulder of Apácara-tepuí, Chimantá Massif, 2100 m alt., June 20, 1953, *Steyermark 75770*; rocky and swampy savanna between west and east branches of headwaters of Río Tirica, Central Section, Chimantá Massif, 2120–2210 m alt., February 11, 1955, *Steyermark & Wurdack 742*; rocky open places on large boulders bordering zanjones in valley of Río Tirica above Summit Camp, Central Section, Chimantá Massif, 1940 m alt., February 7, 1955, *Steyermark & Wurdack 571.*

ANATOMY OF GUAYANA MUTISIEAE[30]

SHERWIN CARLQUIST

I. Pollen.

Certain Mutisieae from the Guayana Highland described by Maguire, Wurdack and collaborators (1957) are remarkable for their unusual growth forms and distinctive morphological features. These genera show an equally interesting diversity when viewed from an anatomical standpoint. Because of the very primitive expressions of characters and severe modifications, they form one of the more critical areas of the Compositae for an understanding of evolution within this family, where anatomical characters appear to be particularly important in suggesting relationship and evolution. Pollen characters represent one facet of the striking variation found within the genera of Guayana Highland Mutisieae considered here.

Material for this study was obtained almost exclusively from the collections of the New York Botanical Garden, made on expeditions described by Maguire, Cowan and Wurdack (1953). For making this material available, the writer wishes to express his sincere appreciation to Dr. Bassett Maguire. Additional specimens, designated here as (GH) were provided through the courtesy of the Gray Herbarium. Grateful acknowledgement is also offered to Dr. I. W. Bailey and Dr. Reed C. Rollins for reading the manuscript and offering helpful suggestions.

METHODS

Because the quantity of pollen obtainable from some specimens was necessarily limited, a series of slides was prepared by making mounts of pollen grains without special treatment. This process consisted of spreading pollen grains from soaked anthers of herbarium material on slides coated with Haupt's adhesive, dehydrating in an ethyl alcohol series, straining with 1 per cent safranin in absolute ethyl alcohol, destaining, transferring to xylene, and using a xylene-soluble resin ("Damar") as a mounting medium. In most instances, a duplicate set of slides was prepared using pollen of flowers cleared in 5 per cent sodium hydroxide. Little difference either in size or detailed structure could be observed as a result of these two methods, and both seemed reliable for the purposes of the present study. Sectioned material of cleared flowers, prepared by means of conventional paraffin techniques and stained with safranin and fast green, was useful for confirming certain details of structure of pollen grains.

Dimensions of pollen grains and exine strata were obtained from fully turgid grains, as evidenced by bulging germ pores. Less turgid grains tend to show greater length (polar axis) and diminished width (equatorial axis). Since variability in size within a species could not be explored (in some species the information on size and morphology was necessarily derived from a single flower), it seemed best to obtain average dimensions from as many grains as showed proper turgidity and maturity and could be measured with certainty. While variation in size obviously exists, the figures given below will serve at least to indi-

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[30] Figures and footnotes in this paper are numbered consecutively with those of "Botany of the Chimantá Massif" (Mem. N.Y. Bot. 9:393–439).

Table 1. Dimensions of Pollen of Mutisieae.

	polar axis, μ	equatorial axis, μ	approximate spine length, μ	width endexine, μ*	width inner ektexine, μ*	width outer ektexine, μ*	total width exine, μ*	total width exine, polar, μ
Stenopadus								
campestris, Maguire 35573	60	60	1-2	1	2	1.5	4.5	5
chimantensis, Steyermark & Wurdack 652	62	46	1	1	1	1.5	3.5	4.5
connellii, Wurdack 34265	65	47	<1	1	1.5	1	3.5	4.5
cucullatus, Maguire & Maguire 35120	58	59	<1	1	1.5	2	4.5	4.5
huachamacari, Maguire et al. 30012	50	41	1	1	1	3	5	5.5
kunhardtii, Maguire & Politi 27896	60	50	<1	1	2	.5	3.5	3.5
obconicus, Maguire et al. 37077	55	44	1	1	1	1.5	3.5	4.5
sericeus, Maguire 33415	57	45	<1	1	1	1	3	4
Stomatochaeta								
condensata, Maguire 40603	48	36	<1	1	1	1	3	3.5
crassifolia, Cowan & Wurdack 31162	46	35	<1	1	1	1	3	3.5
cylindrica, Maguire 32782	49	35	<1	1	1.5	1.5	4	4
cymbifolia, Steyermark & Wurdack 508	51	37	<1	1	1	1	3	4.5
Chimantaea								
cinerea, Cardona 2717	59	40	1-2	1	1.5	2	4.5	4.5
espeletoidea, Steyermark & Wurdack 574	56	47	1	1.5	1.5	1.5	4.5	4.5
lanocaulis, Steyermark 57912	51	47	1	1	1.5	2	4.5	5.5
mirabilis, Steyermark & Wurdack 821	63	48	2	1	1	1.5	3.5	4
rupicola, Steyermark & Wurdack 748	57	46	1-2	1	2	1.5	4.5	4.5
similis, Steyermark & Wurdack 605	58	47	1	1	2.5	1.5	5	5
Quelchia								
bracteata, Steyermark & Wurdack 754	52	45	2-3	2	3.5	3	8.5	9
cardonae, Steyermark & Wurdack 565	53	47	2	2	3	3	8	7.5
conferta, Pinkus 112	56	44	2	1	3.5	3.5	8	8
× *grandifolia, Steyermark & Wurdack 755*	50	48	2	2	3	3	8	
Stifftia								
chrysantha, Trin. Bot. Gard. 1330 (GH)	77	66	1	1	3	3.5	7.5	8-9
uniflora, Schultes 4719 (GH)	54	44	1-2	1	1.5	2	4.5	3.5
Gongylolepis								
bracteata, Maguire 37560	78	78	4	2.5	5	4	11.5	12
fruticosa, Steyermark & Wurdack 1136	55	55	2	2	2	3.5	7.5	7.5
huachamacari, Maguire et al. 30262	73	69	5	2	7	7	16.5	16.5
martiana, Schultes 14158 (GH)	85	83	4	3	5	5	13	12

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*Optical section of equator, at middle of intercolpar area.

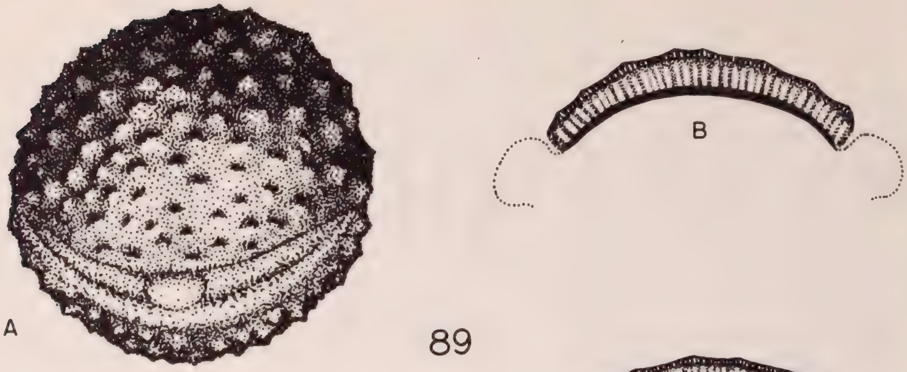
	polar axis, μ	equatorial axis, μ	approximate spine length, μ	width endexine, μ*	width inner ektexine, μ*	width outer ektexine, μ*	total width exine, μ*	total width exine, polar, μ
paniculata, Maguire & Maguire 35392	76	75	4	2.5	6.5	5	14	15
paruana, Maguire et al. 30256	65	64	3	2	6	4	12	12.5
pedunculata, Cowan & Wurdack 31131	79	80	4.5	3	6.5	5.5	15	12
Achnopogon								
virgatus, Steyermark & Wurdack 742	52	46	2	1.5	4	3	8.5	10
Neblinaea								
promontorium, Maguire et al 37016	50	40	1-2	2	3.5	3	8.5	8.5
Duidaea								
pinifolia, Steyermark 58143	55	50	3	1.5	3.5	4	9	9
tatei, Steyermark 58204	58	45	1	1.5	3	2.5	7	8.5
Glossarion								
rhodanthum, Maguire et al. 37190	56	52	2	2	3	3.5	8.5	7

cate some relatively prominent differences among the genera and species represented. In the data below, the length of spines is included in all measurements except endexine and inner ektexine thickness.

The terminology in this study is derived mostly from the lucid and graphic handbook of Faegri and Iversen (1950). As increasing knowledge of detailed structure of pollen has accumulated, new terms have been added to the literature; those of Faegri and Iversen seem the most practicable at the present moment. For descriptions of grain shape and spine length, the terms of Erdtman (1952) have been used.

DESCRIPTIONS

Several features are common to all the pollen grains of the genera discussed here. As the drawings of entire grains show, the three furrows on each grain are long and pointed, with the edges clearly defined. Optical sections, shown to the right in each plate, demonstrate the three-layered nature of the exine. The innermost of these layers, endexine (referred to by Erdtman as "nexine"), is unsculptured. Exterior to the endexine, and adherent to it, is the two-layered ektexine. The inner ektexine (termed "endosexine" by Erdtman), which is apparently continuous with the endexine and like it in staining properties, is composed of rods. These rods (called "bacula" by Erdtman) may be variously shaped and fused with each other, and are surrounded by a network of spaces apparently not filled by any solid material. Transections of this layer (i.e., sections tangential to the surface of the grain) may be seen in figures 95C, 96C, 98C, and 100C. The outer ektexine differs from the inner ektexine in its staining properties and finer



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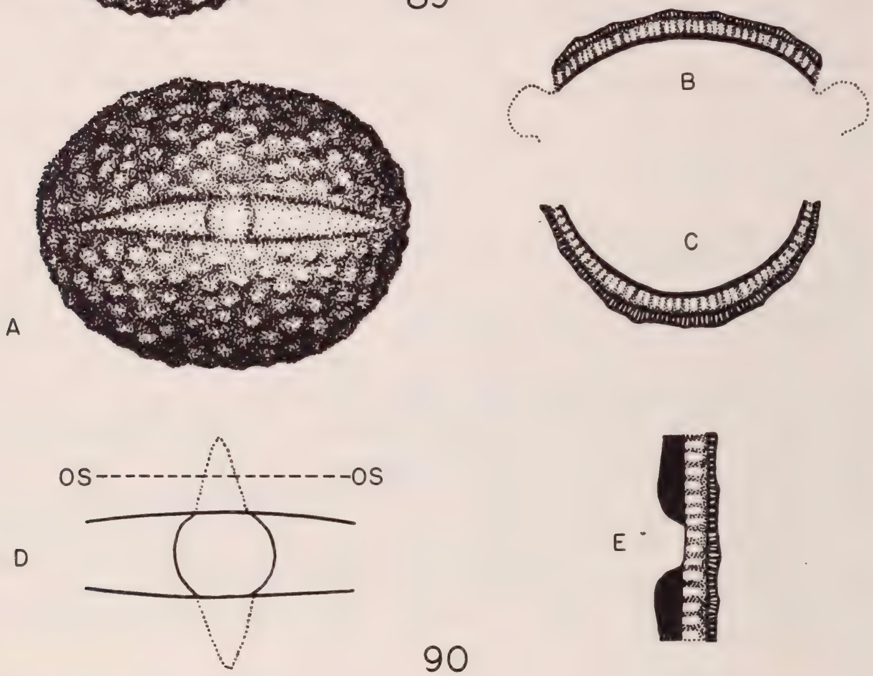

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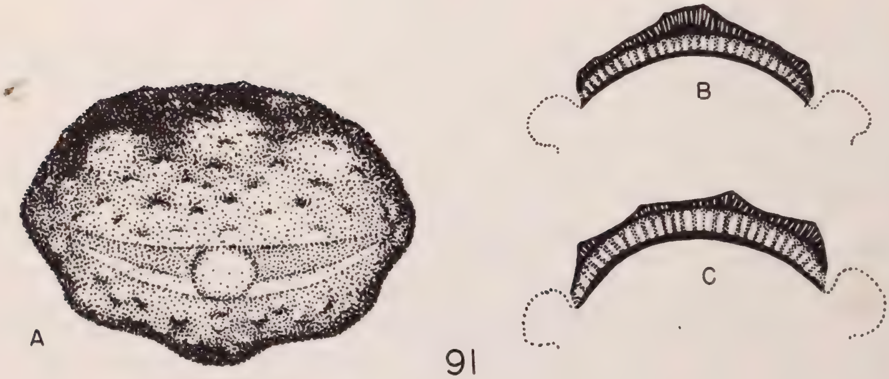


91

structure. Outer ektexine may be seen to contain extremely fine striae or chambers which are often at the limit of visibility of the light microscope. Since the finer structure of the exine in Mutisieae has been little studied to date, the pattern described above has not been previously reported for this group, although the drawings of Erdtman (1952) for *Mutisia speciosa* suggest it.

Variations in the thickness of the exine layers may be seen within an individual pollen grain, although the relative thickness of layers, as seen at an arbitrarily chosen plane of section, is a character of taxonomic importance. An example of variation in thickness of exine layers within a single pollen grain is seen for *Stenopadus hauchamacari* in figure 90. In this pollen grain, the ektexine layers show a greater thickness at the poles of the grain. As a comparison of the measurements in table 1 shows, this difference is found in a number of the genera considered here. The thickness of the exine may be approximately constant within a grain, however, with differential prominences of each layer at various places in the grain. In *Stomatochaeta cylindrica* (fig. 92 B, C), for example, the endexine and outer ektexine are thicker, the inner ektexine thinner, at the poles than at the equator. In *Stomatochaeta condensata* (fig. 92 D), the inner ektexine is so narrowed at the poles that no sculpturing could be seen in that layer, although the outer ektexine is quite conspicuous.

Although differences in polar versus equatorial thickness are not present in all species, a transverse furrow (fig. 90 D, E), caused by a thinning in the endexine, was seen in all species. This furrow is adjacent to the germ pore and runs at right angles to the colpa. The shape of this transverse furrow, as shown in figure 90D, was relatively constant for all the taxa investigated. This structure was found by Wodehouse (1929 a, b) in many of the Mutisieae he studied.

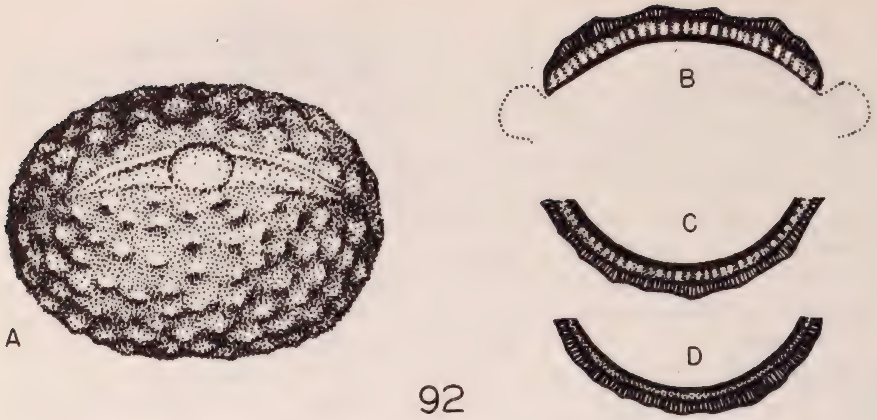
The genera below are arranged in two main groups. Those of the first *(Stenopadus* through *Wunderlichia)* have actinomorphic flowers and belong to the subtribe Gochnatinae. In the remaining genera, with the exception of *Glossarion,* the corolla form is exclusively bilabiate (Gerberinae). In *Glossarion* the corollas are ligulate in form.

Stenopadus.

With the exception of *S. campestris,* the species of *Stenopadus,* as exemplified by *S. chimantensis* fig. 90 A, B), have the following characters in common. The grains have an elliptic outline, this shape being described by Erdtman (1952) as subprolate for those of narrower shape, or prolate sphaeroidal for those approaching more nearly a sphaeroidal form. The outer ektexine is virtually smooth (psilate), the spinulose emergences being one micron or less high. *Stenopadus campestris* (fig. 89 A, B) shows a sphaeroidal shape, with minute spines (spinulose) somewhat larger than those in the other species. All species of *Stenopadus* show a relatively thin exine, approximately 3 to 5 microns in thickness.

Explanation of Figures 89–91

FIG. 89. *Stenopadus campestris;* A, pollen grain; B, optical section of grain at equator (germ pores shown at right and left). FIG. 90. A, *Stenopadus chimantensis,* pollen grain; B, *S. chimantensis,* optical section of grain at equator; C, *S. huachamacari,* optical section of pole of grain; D, diagram showing portion of colpa of *S. chimantensis,* enlarged; transverse furrow is shown above and below germ pore by dotted lines; E, portion of exine in plane of optical section indicated by OS–OS in D. FIG. 91. A, *Stifftia chrysantha,* pollen grain; *S. chrysantha,* optical section of grain at equator; C, *Wunderlichia mirabilis* (*Glaziou 2168G;* GH), optical section of grain at equator. FIG. 90 D, E, × 1600; 91 A, B, × 700; all others, approximately × 800. Specimens represented are indicated in table 1.



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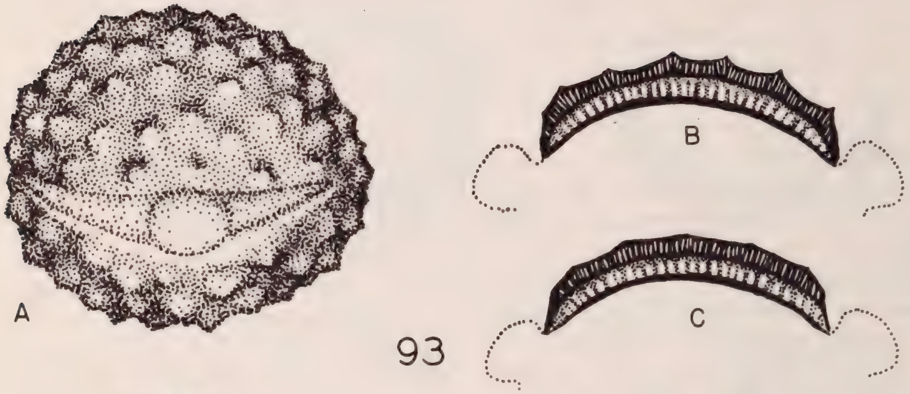

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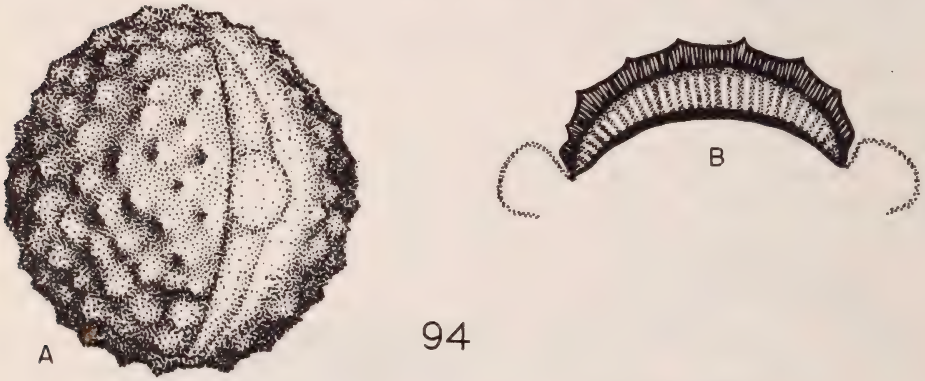

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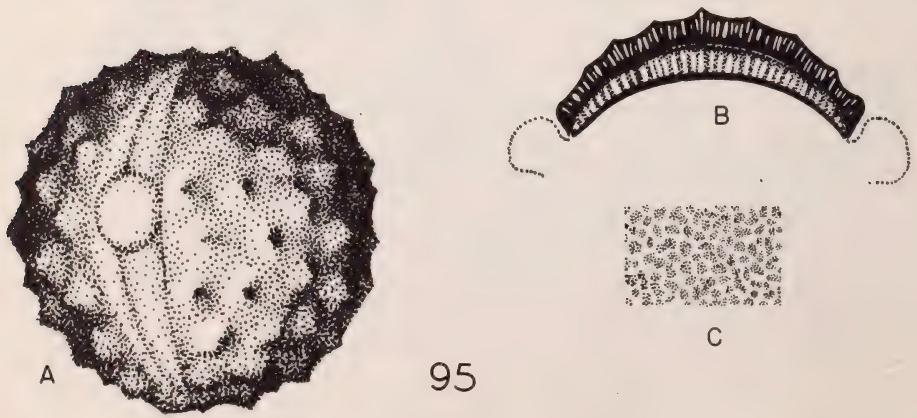

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Stomatochaeta.

Pollen grains of the species of *Stomatochaeta* agree closely with those of *Stenopadus* other than *S. campestris*. As shown for *Stomatochaeta cylindrica* in figure 92 A-C, the grains are subprolate in shape. Furrows are shorter than in *Stenopadus*. The exine is psilate or nearly so, and exine thickness is approximately the same as in *Stenopadus*. Grains of *Stomatochaeta*, however, seem to be appreciably smaller than those of most species of *Stenopadus*.

Chimantaea.

Although not conspicuously different from those of the above genera, the pollen grains of *Chimantaea* have somewhat more prominent spines and greater exine thickness. While some species are spinulose, such as *C. rupicola* (fig. 93 A, B), others are more nearly psilate, such as *C. similis* (Fig. 93 C). The variation in shape of pollen grains is approximately that found in *Stenopadus*, ranging from subprolate to prolate sphaeroidal. In size, the pollen grains of *Chimantaea* also fall within the range found in *Stenopadus*.

Quelchia.

Pollen grains of *Quelchia* are easily separable from the above genera by virtue of the greater exine thickness and somewhat more prominent spines. *Quelchia barcteata* (fig. 94 A, B) is typical for the genus, as indicated by the material available. As shown in table 1, exine thickness and spine length are appreciably greater in *Quelchia;* in shape, however, the grains are subprolate to prolate sphaeroidal, like those of *Stenopadus*.

Stifftia.

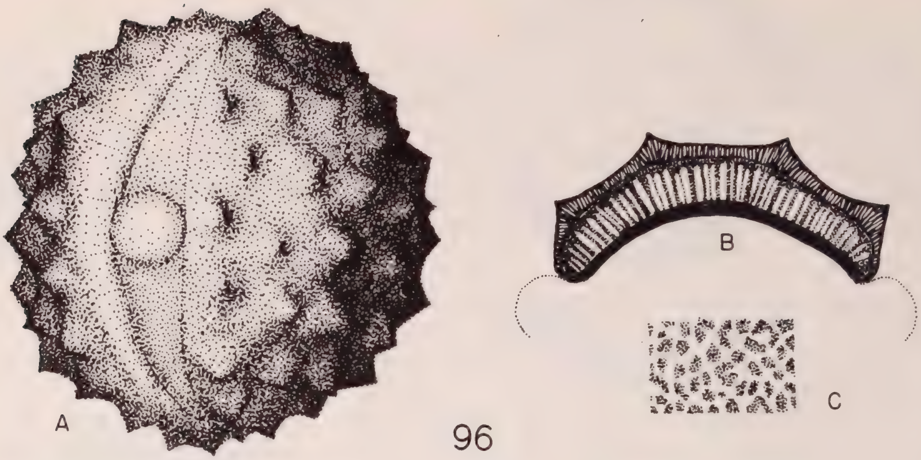
The genus *Stifftia*, although not found on the Guayana Highland, shows some degree of relationship to the above genera and may be considered in this connection. The pollen grains of *Stifftia chrysantha* (fig. 91 A, B) have a remarkable feature not previously reported for Mutisieae. Evenly arranged on the surface of these grains are eleven areas of thickened exine, three on each intercolpar face and one at each pole. These thickenings are the result of greater development of the outer ektexine (fig. 91 B). Numerous wide but very short spines or emergences occur on the thickened areas of the exine as well as on the unthickened areas. However, no such thickened areas are found on the pollen of *Stifftia uniflora*, the grains being evenly spinulose. The pollen grains of *S. uniflora*, not illustrated here, would match closely the drawings of *Chimantaea rupicola* in figure 93 A, B. In shape, the pollen grains of these two species of *Stifftia* are dissimilar, since *S. chrysantha* has large, subprolate grains, while those of *S. uniflora* are smaller and prolate sphaeroidal. Excepting the thickened areas in *S. chrysantha*, the exine thickness of these two species is very similar; likewise both have long, narrow furrows.

Wunderlichia.

Before discussing the genera which have corollas bilabiate or ligulate in form, the genus *Wunderlichia* may be mentioned. As suggested by Wodehouse (1929 b),

Explanation of Figures 92-95

FIG. 92. A-C, *Stomatochaeta cylindrica;* A, pollen grain; B, optical section of grain at equator; C, optical section of grain at pole; D, *S. condensata*, optical section of grain at pole. FIG. 93. A, *Chimantaea rupicola*, pollen grain; B, *C. rupicola*, optical section of grain at equator; C, *C. similis*, optical section of grain at equator. FIG. 94. *Quelchia bracteata;* A, pollen grain; B, optical section of grain at equator. FIG. 95. *Glossarion rhodanthum*; A, pollen grain; B, optical section of grain at equator; c, section of inner ektexine tangential to grain surface. Figure 95 C, × 1000. All others, approximately × 800. Specimens represented are listed in table 1.



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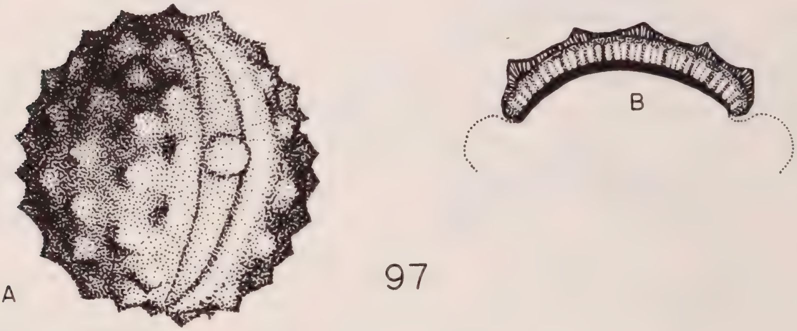

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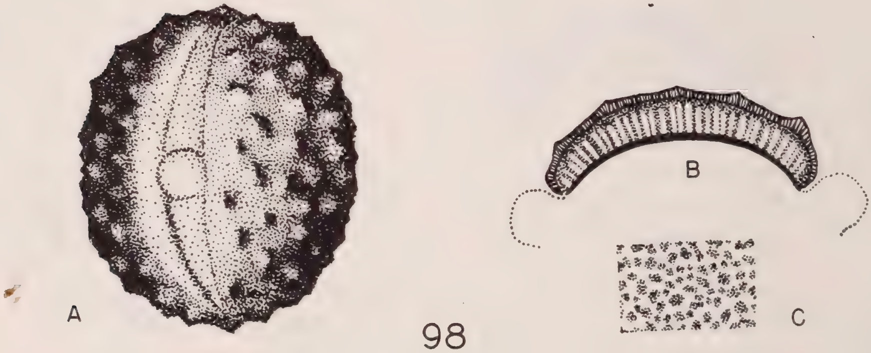

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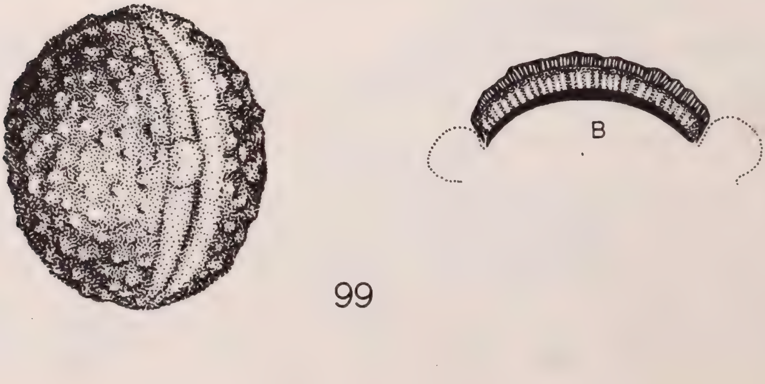

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this genus represents an anomalous element in the subtribe Gochnatinae. An entire grain of *Wunderlichia mirabilis*[31] has been illustrated by Wodehouse (1929 b). Although the furrows are somewhat shorter than in the genera considered here the exine sculpturing (shown in optical section, Fig. 91 C) is not markedly different from that of other genera in the present study. In terms of its structural characters, the pollen of *Wunderlichia* seems well within the range of the Gochnatinae considered in this paper. It is of interest to note that according to the measurements given for this species by Wodehouse, it is the only member of the Gochnatinae he investigated which matches in its dimensions the relatively large pollen grains characteristic of all the Gochnatinae in the present study.

Gongylolepis.

As the dimensions of table 1 and the drawings of *G. pedunculata* (fig. 96 A, B) show, most species of *Gongylolepis* are markedly different from all other taxa studied here. With the exception of *G. fruticosa,* all the species of *Gongylolepis* have larger grains, sphaeroidal in shape, with thicker exine and longer spines than pollen grains of the other genera. As seen in figure 96 B, the two layers of the ektexine are particularly well developed, the inner showing relatively large rods (seen in a section tangential to the grain, fig. 96 C). *Gongylolepis fruticosa* (fig. 97 A, B) has a decidedly diminished expression of these characters, but is still distinguishable from grains of other taxa of this study by virtue of the sphaeroidal shape and prominent spines.

Achnopogon.

The monotypic genus *Achnopogon* shows considerable similarity to *Gongylolepis* in its pollen grain structure. However, the grains are not sphaeroidal, the shape being best described as prolate sphaeroidal (fig. 98 A). As shown in figure 98 B, the thick exine, with a particularly prominent inner ektexine, is reminiscent of *Gongylolepis.* The rods of the inner ektexine (fig. 98 C) are smaller than those of the large-grained species of *Gongylolepis.* The spine dimensions are likewise smaller. Except for shape, pollen grains of *Achnopogon* are very close to those of *Gongylolepis fruticosa.*

Neblinaea.

Pollen grains of the monotypic genus *Neblinaea* (fig. 99 A, B) have a close affinity to those of *Gongylolepis* and *Achnopogon.* However, the spines are less prominent than in either of these genera, the grains being less markedly spinulose. As in *Achnopogon,* the shape of pollen grains of *Neblinaea* is prolate sphaeroidal. The exine is only slightly thinner than that of *Gongylolepis fruticosa,* the two layers of the ektexine being about equally prominent.

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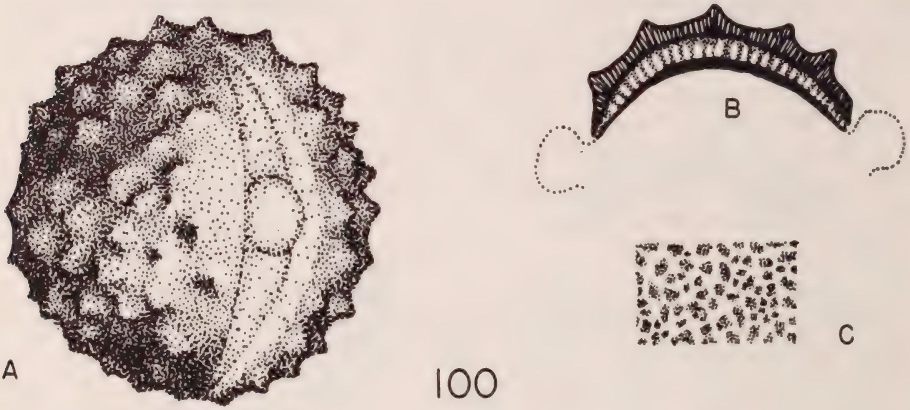
[31] The name used by Wodehouse, "*W. tomentosa,*" is a nomen nudum. A comparison of plants distributed by Glaziou under this name (e. g. *Glaziou 2168G*) with the description of the type species of the genus, *W. mirabilis* Ried., seemingly reveals no appreciable differences (see, for example, Hook. Ic. pl. 1496). Pending a new treatment of the genus, these plants may be regarded as belonging to *W. mirabilis.*

Explanation of Figures 96–99

FIG. 96. *Gongylolepis pedunculata;* A, pollen grain; B, optical section of grain at equator; C, section of inner ektexine tangential to grain surface. FIG. 97. *Gongylolepis fruticosa;* A, pollen grain; B, optical section of grain at equator. FIG. 98. *Achnopogon virgatus;* A, pollen grain; B, optical section of grain at equator; C, section of inner ektexine tangential to grain surface. FIG. 99. *Neblinaea promontorium;* A, pollen grain; B, optical section of grain at equator. Figures 96C, 98C, × 1000; all others, approximately × 800. Specimens represented are listed in table 1.

Duidaea.

The distinctive genus *Duidaea* has pollen grains, in *D. pinifolia,* similar to those of *Gongylolepis.* Grains of *D. pinifolia* (fig. 100 A-C) are sphaeroidal and spinose, and have thick walls. Rods of the inner ektexine (fig. 100 C) are relatively small. No features other than those found in *Gongylolepis,* however, characterize *D. pinifolia.* The exine structure of *D. tatei* (fig. 101 A-C), therefore, is surprising. Large lobe-like thickenings are found in intercolpar and polar areas. These are distributed symmetrically, two on each intercolpar face and one on each pole. In terms of the layers of the ektexine, this thickening is chiefly reflected by a widening of the outer ektexine (fig. 101 C), although the inner ektexine is also thicker in these areas. In addition to these prominent emergences, numerous minute spines are present on the unthickened areas of the exine. Pollen of *D. tatei* is further distinguished from that of *D. pinifolia* in that the shape of the grains is basically subprolate.



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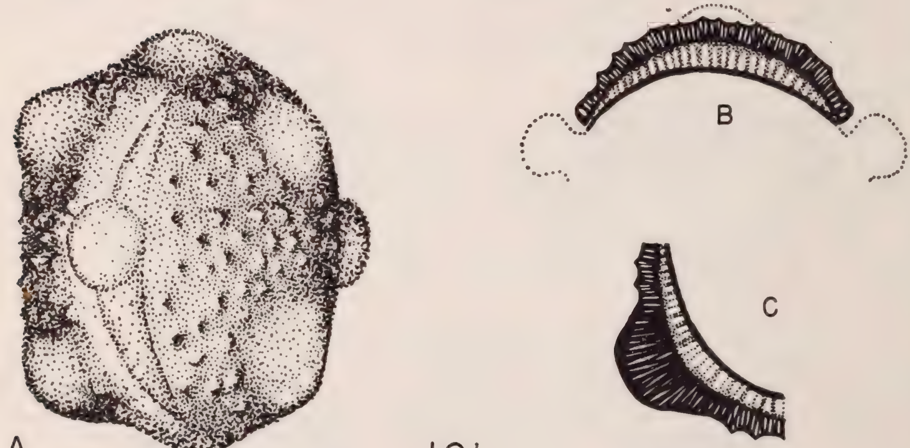

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FIG. 100. *Duidaea pinifolia;* A, pollen grain; B, optical section of grain at equator; C, section of inner ektexine tangential to grain surface. FIG. 101. *Duidaea tatei;* A, pollen grain; a germ pore is shown at extreme right; B, optical section of grain at equator; dotted line, above, indicates outline of an intercolpar thickened area below the plane of the optical section; C, longitudinal optical section of grain, showing a thickened area such as is indicated at lower left in A. Figure 100, × 1000. All others, approximately × 800. Specimens represented are listed in table 1.

Glossarion.

Despite the anomalous corolla form of the monotypic genus *Glossarion*, pollen grains of this plant (fig. 95 A-C) are not unlike those of other genera considered here, since they have a sphaeroidal shape and bear short, broad spines. There is little conclusive evidence for placing *Glossarion* in the stenopadoid or gongylolepoid line on the basis of pollen alone. The very fine pattern of the inner ektexine (fig. 95 C) resembles that of *Stenopadus* and its allies. Except for *Quelchia* and *Stifftia*, however, none of those genera has such a thick exine. A feature not seen in pollen of any other genera studied here besides *Glossarion* is the possession of a third ektexine layer. This layer occurs between the two ektexine layers comparable to those found in the other pollen described (fig. 95 B). It was not possible to determine to which of these ektexine layers this deep-staining middle could be referred.

DISCUSSION

The facts presented above suggest some degree of generic differentiation in pollen grain structure and dimensions. Differences found among the stenopadoid genera in these respects correspond with the conclusions reached by Maguire (1956) and Maguire et al. (1957) on the basis of gross morphological study. *Stenopadus, Stomatochaeta,* and *Chimantaea* show great similarity in their pollen grains, differences being relatively minor; *Quelchia* pollen grains are easily distinguishable from the foregoing genera, though they show similarities. Also in agreement with the conclusions of Maguire and his coworkers are the resemblances in pollen grain structure found among the genera *Gongylolepis, Duidaea, Neblinaea,* and *Achnopogon.* The thick exine common to these genera is significant; minor differences in spine length and grain size parallel the generic lines.

The pollen grains of *Stifftia* have many features of resemblance to those of *Stenopadus* and its allies. Taken as a group, pollen grains of all the genera discussed here illustrate a basic pattern upon which variations have taken place. In at least two genera *(Stifftia* and *Duidaea)* species can be separated on pollen characters.

Since some of the Mutisieae considered here (particularly *Stenopadus)* demonstrate as large a constellation of primitive characters as may be found in the tribe, it is of interest to examine the pollen in this connection. On the basis of his work with various genera and species of Mutisieae, Wodehouse (1929 a) suggests that short furrows and a spinose exine are primitive in the tribe, and that the lengthening of furrows and the decreasing of spine size are indications of a phyletic advancement. The fact that all the genera in the present study (with the exception of *Stomatochaeta* and *Wunderlichia)* have very long furrows would seem to render Wodehouse's suggestion on furrow length open to question. Both long and short furrows occur in both putatively primitive and advanced Mutisieae, and this character may be of little importance phyletically. Likewise, while a spinose nature, variously expressed, is seen in virtually all Mutisieae, reduction to a psilate condition may occur within a single genus, as shown by Wodehouse (1929 b) in *Moquinia.* This character, then, may also be unreliable as a phylogenetic indicator.

In respect to pollen grain shape one would expect, on the basis of primitive Heliantheae, a sphaeroidal shape to be primitive. Both sphaeroidal and markedly elliptical pollen grains occur in areas of the Mutisieae which are not closely related. Most of the genera considered here show a close approach to the sphaeroidal condition, however, and the more markedly elliptical grains seem to indicate a specialization. The very small and decidedly elliptical grains found by Wodehouse (1929 a) in *Trixis* and by Erdtman (1952) in *Mutisia* are likewise seemingly advanced.

The development of areas of thickened exine, seen here particularly in *Stifftia chrysantha* and *Duidaea tatei,* would seem to be an advanced character. Polar thickenings, such as those seen to a moderate extent in several of the genera considered in this paper, have been reported by Wodehouse (1929 a, b) for a number of genera of Mutisieae which are not regarded as being closely related. Polar thickenings, therefore, may represent a sporadic tendency within the tribe, and may perhaps be regarded as advanced, at least where most conspicuously expressed.

It is of interest to compare the two-layered ektexine in the Mutisieae with the condition found in the Heliantheae. In *Helianthus annuus* (illustrated by Erdtman, 1952) and other relatively primitive Heliantheae examined by the writer, a thick ektexine consisting of only a single layer but containing small lumina (largely restricted to the spine basis) is found exclusively. It seems apparent that the types of exine stratification found in putatively primitive Heliantheae and Mutisieae respectively represent two lines. Speculation concerning the relative primitiveness of these two patterns would not seem justified because of our extremely limited knowledge of this essentially cytological character. It is of interest, however, that the more complicated ektexine occurs in other tribes of Compositae, as an examination of the drawings of Erdtman (1952) will show.

II. Floral Venation

The genera of Guayana Highland Mutisieae treated taxonomically earlier in this series by Maguire et al. (1957) demonstrate a wide variety of floral venation patterns. Among these are the most complicated yet to be reported for the Mutisieae, and indeed, the most elaborate yet found in the Compositae at large. Since floral anatomy appears to be of considerable evolutionary significance within the Compositae, a description of these patterns seems desirable.

Herbarium material was used exclusively for these studies, and the kindness of Dr. Bassett Maguire in providing this material from the Herbarium of the New York Botanic Garden is gratefully acknowledged. Several additional specimens, designated here as (GH), were made available through the courtesy of the Gray Herbarium, Harvard University. For reading the manuscript and offering helpful suggestions, sincere appreciation is expressed to Dr. Reed C. Rollins and Dr. I. W. Bailey.

METHODS

Whole mounts of corollas, achenes, and styles were used to a large extent in determining venation. These were prepared by clearing in warm 2.5 per cent aqueous sodium hydroxide until most of the cellular contents had been removed; further clearing was achieved by prolonged treatment in 25 per cent aqueous chloral hydrate. After clearing, specimens were washed, dehydrated in an ethyl alcohol series, stained with a 1 per cent safranin solution in absolute ethyl alcohol, destained, transferred to xylene, and mounted in a xylene-soluble resin ("Damar"). Because achenes become sclerified upon maturation, obscuring venation, and because the disposition of interior and exterior bundles in the achene cannot be ascertained from clearings, serial sections of flowers were prepared to supplement information derived from the whole mounts. These were made by embedding cleared flowers according to the tertiary butyl alcohol series of Johansen (1940) and staining sections following Northen's modification of Foster's tannic acid–ferric chloride method (Johansen 1940).

DRAWING CONVENTIONS

All the species in this study are discoid (although the flowers of *Glossarion* are ligulate in form from the standpoint of gross morphology). The accompanying drawings of floral parts, therefore, represent the venation of a particular disk flower. Although the parts of a flower have been separated for purposes of drawing, they may be interpreted as being intercontinuous. This separation was necessary because of the great complexity of venation. The proportions of the parts and the locations of veins within them reflect as accurately as possible the actual condition in the material studied, but an effort has been made to render the drawings simpler by avoiding the crossing of bundles over one another, such as is seen when viewing a given preparation of a style or achene. In species where variable numbers of lesser veins may be found in flowers, a more complicated flower is usually represented, and simpler conditions, if they were found to occur, are described in the text.

The corollas, which appear first in each figure, are shown to be cut the length of the tube and spread flat. This cut, which corresponds to the manner in which whole mounts of corollas were prepared, is made slightly to one side of the adaxial sinus of the corolla tube, and is indicated by the portion of the corolla outline drawn in lines broken at wide intervals. Stamen traces are indicated by lines broken at narrow intervals. Because stamen traces may vary in length depending on the state of development of the flower, they are of interest only in respect to the point in the corolla tube at which they depart (indicated by a curving away from the adjacent veins) and in respect to their union with corolla veins (mostly in the achene, just beneath the base of the corolla). For reasons of simplification, stamen traces are not shown in the drawings of entire achenes, but they are shown in the transection of the corolla base in each figure.

Styles and achenes are viewed laterally, i.e. in the position in which they would be seen in a radial section of a head. Thus the two stigmatic branches at the apex of a style, which are disposed adaxially and abaxially, are shown at right and left in each drawing. Bundles of the style which continue into the achene are extended beyond the outline of the style. The styles drawn do not include the nectary, which would be beneath the base of the style in the taxa in which a nectary is present.

The Mutisieae investigated in this study have two series of bundles in the achene. The exterior bundles are connected above with veins of the corolla or terminate freely in the top of the achene; the interior bundles are continuous with the style bundles or terminate freely in the upper portion of the achene. These two series of bundles are considered to represent perianth and carpellary bundles respectively, and a distinction is consequently made. The exterior bundles of the achene are shown in unbroken lines; the interior bundles and ovule trace are represented by broken lines. In many of the drawings, these two sets of bundles are shown in complementary pairs of drawings, because to show both of them in a single drawing would be too complicated. Since the style bundles are a continuation of the interior bundles, they are shown in broken lines in the achene drawings. Where the two sets of bundles are separate, portions of the exterior bundles are shown on the carpellary bundle drawing if interior bundles connect with them, and may be distinguished from the interior bundles since they are drawn in unbroken lines. Portions of the bundle or bundles which extend from the achene into the receptacle are shown in order to indicate the nature of vascular connections between these two structures.

A series of selected transections, starting from the corolla base and going to the achene base, is shown for most of the figures. This series is intended to show the disposition of exterior and interior bundles, and to aid in interpreting

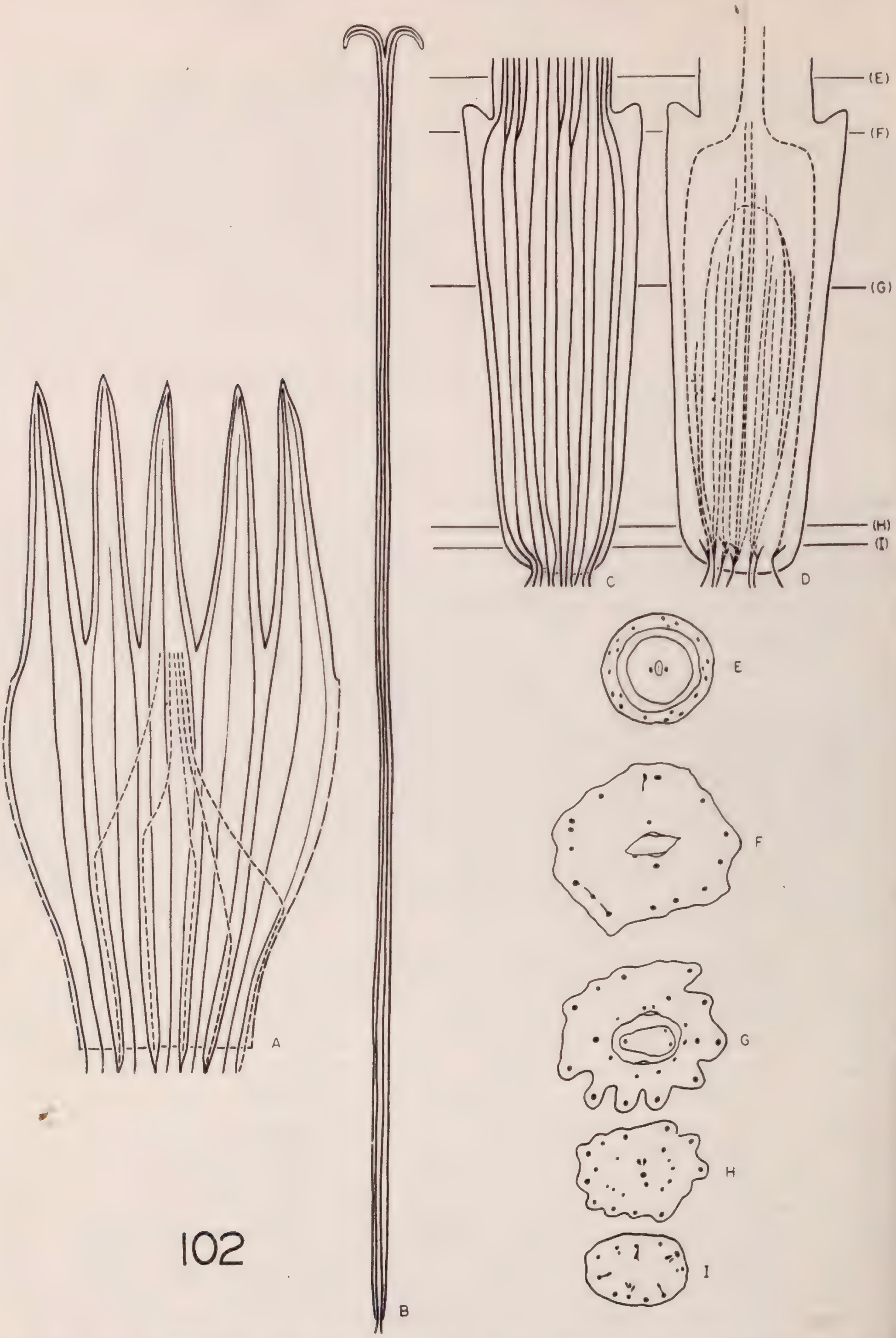


FIG. 102. *Stenopadus campestris* (*Maguire 35573*), portions of flower drawn to show venation. A, corolla; B, style; C, achene, showing exterior bundles; D, achene showing interior bundles; E–I, successive sections of the corolla base and achene at levels indicated by (E) to (I) above. A, B, × 4.5; C–I, × 9. Further explanation of conventions in text.

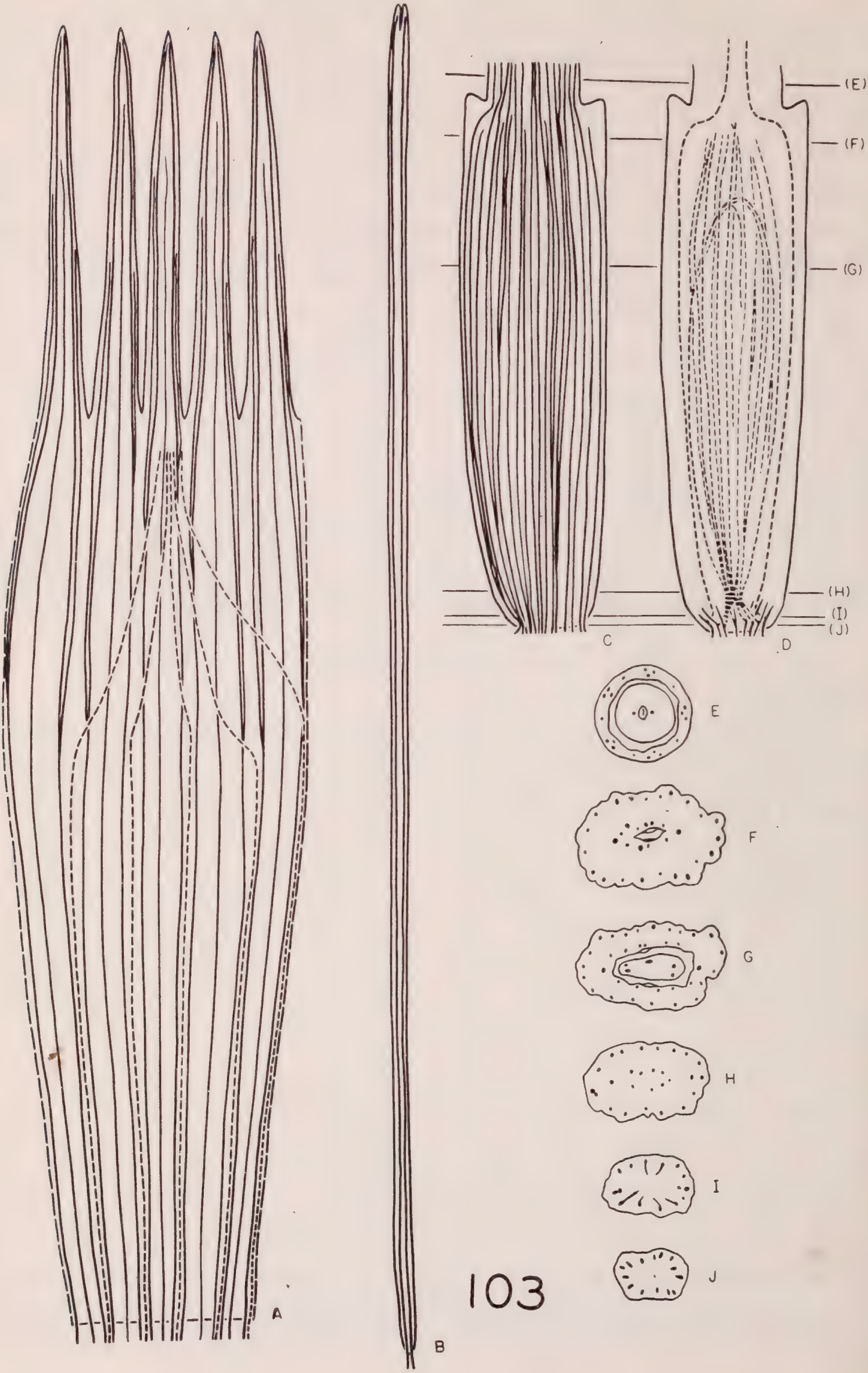
the drawings of entire achenes. In these sections, the outlines of the corolla and nectary (or style base) are shown, and for the achene, those of the achene wall and ovule. The two strands of stigmatic tissue, which occur as fused bands in the style, separating to lateral positions on the inner face of the achene wall (rejoining at the base of the achene cavity and running toward the micropyle) are shown as variously shaped ellipses in these drawings.

The terms "vascularization" and "venation" in this study refer only to xylem elements, unless phloem is specifically mentioned. In many bundles, the phloem is coincident with the xylem. It should be understood, however, that this is by no means always the case. In achenes particularly, strands of phloem may be present without any accompanying xylem. Such strands may be found as internal bundles in the achene. In addition, they interconnect bundles in the achene top. In species in which the xylem of stamen traces was not seen to connect with other bundles at the base of stamen traces, phloem elements could often be seen to interconnect these bundles. In all species, strands of phloem, connecting to bundles at the achene top, branch to form an anastamosing network in the nectaries. This phloic vascularization of nectaries has been described for certain Compositae by Frei (1955) and need not be detailed here. In many of the taxa studied here, phloem strands could be seen to branch from exterior achene bundles at the achene top and terminate freely at the base of pappus bristles. The addition of phloic bundles to the vasculation drawings would have made them complex beyond interpreting, and would have added no critical features not also exhibited by xylem. Phloem has therefore been omitted in the drawings and xylem is used as the prime indicator of the vascular pattern of the flower.

DESCRIPTIONS

Stenopadus.

This genus demonstrates the most elaborate floral venation yet found in Compositae. A basic but by no means typical situation is found in *Stenopadus campestris* (fig. 102). In the corolla of this species (fig. 102A), a pair of lateral veins is found in each lobe. These extend from the tips of the lobes to the base of the corolla; adjacent laterals fuse in the achene top, not in the corolla itself. Occasionally (fig. 102 C, extreme right), adjacent laterals do not fuse but remain separate in the achene. In addition to the laterals, median veins are present in each lobe. Median veins extend for various distances into the corolla lobes. If they do not extend to the tip, they terminate freely, as do the laterals; if they do extend to the tip, they join with one of the laterals at the tip. Median bundles extend into the achene, where they continue as five of the exterior bundles (fig. 102 C). The xylem of stamen traces terminates freely in the top of the achene or joins with that of corolla bundles. In details of venation, the corolla of *S. campestris* resembles that found in *Fitchia speciosa* of the Heliantheae (Carlquist 1957b). The style of *S. campestris* (fig. 1 B) is vascularized by a pair of dorsiventrally arranged bundles; these continue into the achene (fig. 102 D), joining two of the exterior bundles on opposite sides of the achene base. In addition, numerous other interior bundles are present in the achene. At the achene base, a lateral pair of these join with the ovule trace for a short distance (fig. 102 H), separating below to join exterior bundles, as do the remainder of the interior bundles (fig. 102 I). Thus, there are approximately ten bundles arranged in a cylinder passing from the achene base into the receptacle. The ovule trace (fig. 102 D, G) branches dichotomously in the chalaza, and the adaxial portion is double.


A
B
C
D
(E)
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(I)
(J)
E
F
G
H
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103

A somewhat more complex situation is represented by *Stenopadus kunhardtii* (fig. 103). In the corolla (fig. 103 A), lateral and median veins are present, as in *S. campestris*. In addition, subsidiary veins branch from the laterals at various points between the level of departure of stamen traces and the bases of the sinuses. These subsidiary veins occupy a position between the lateral veins and the margins of each lobe, and extend for various distances into the distal portion of the lobes, where they terminate freely. This pattern of corolla venation has been found elsewhere in the Compositae only in *Fitchia mangarevensis* (Carlquist 1957 a, b). At the base of the corolla of *S. kunhardtii*, the laterals continue into the achene, without fusion of adjacent laterals (fig. 103 C). Likewise, the five median veins of the corolla extend into the achene independently. The xylem of stamen traces terminates freely in the achene top. In the achene, more than the fifteen bundles continuous with those of the corolla are found. These additional exterior bundles (fig. 103 C) are branches of the fifteen corolla bundles. As in *S. campestris*, the style of *S. kunhardtii* contains two bundles (fig. 103 B) which connect with a dorsiventrally arranged pair of bundles in the achene (fig. 103 D). These connect with adjacent exterior bundles in the achene base (see also fig. 103 I, J). Numerous other interior bundles are present in the achene. These terminate freely above, but connect in a plexus with the ovule trace below, this plexus then separating to join several of the exterior bundles in the achene base (fig. 103 I). The ovule trace (seen also in fig. 103 G) is branched several times. At the base of the achene, a cylinder of bundles enters the receptacle.

In *Stenopadus stipitatus* (fig. 104), as in *S. kunhardtii*, there is a remarkably complex corolla vasculation (fig. 104 A). Because of the various ways in which the bundles unite, the designation of median, lateral, and subsidiary bundles cannot be made in *S. stipitatus*. The basic pattern of five bundles in each corolla-lobe seems evident, however. All bundles of the corolla-lobes terminate freely above. At the corolla base, as in *S. kunhardtii*, the bundles in the corolla tube pass into the achene without union of adjacent laterals (fig. 104 C). Xylem of most stamen traces terminates freely in the achene summit without coming in contact with that of the corolline bundles. As in the two above species, two style bundles are present (fig. 104 B, C, E). These are connected with a dorsiventral pair of interior achene bundles (fig. 104 D). In addition, a lateral pair of interior bundles is present; all four interior bundles, together with the ovule trace, form a vascular plexus at the achene base (fig. 104 H). This separates, further down, to form strands joining the exterior bundles (fig. 104 I). The ovule trace is dichotomous on the adaxial face of the ovule (fig. 104 G). As in the above species, a cylinder of bundles enters receptacular tissue.

In *Stenopadus cucullatus* (fig. 105), a much simpler corolla venation is found (fig. 105 A). Lateral bundles, which fuse at the apex of each corolla lobe, are present, but median veins are only occasionally present in lobes, and do not extend into the tubular portion of the corolla. As in *S. kunhardtii* and *S. stipitatus*, the lateral bundles enter the achene, without union of adjacent laterals, and form a series of external bundles (fig. 105 C). In the style (fig. 105 B), a pair of larger dorsiventrally arranged bundles is present; in addition, a lateral pair of small bundles extends part way up the style, fusing with the larger bundles.

Explanation of Figure 103

FIG. 103. *Stenopadus kunhardtii* (*Maguire & Politi 27896*), portions of flower drawn to show venation. A, corolla; B, style; C, achene, showing exterior bundles; D, achene, showing interior bundles; E–J, successive sections of corolla base and achenes at level indicated by (E) through (J) above. A, B, × 4.5; C–J, × 9.

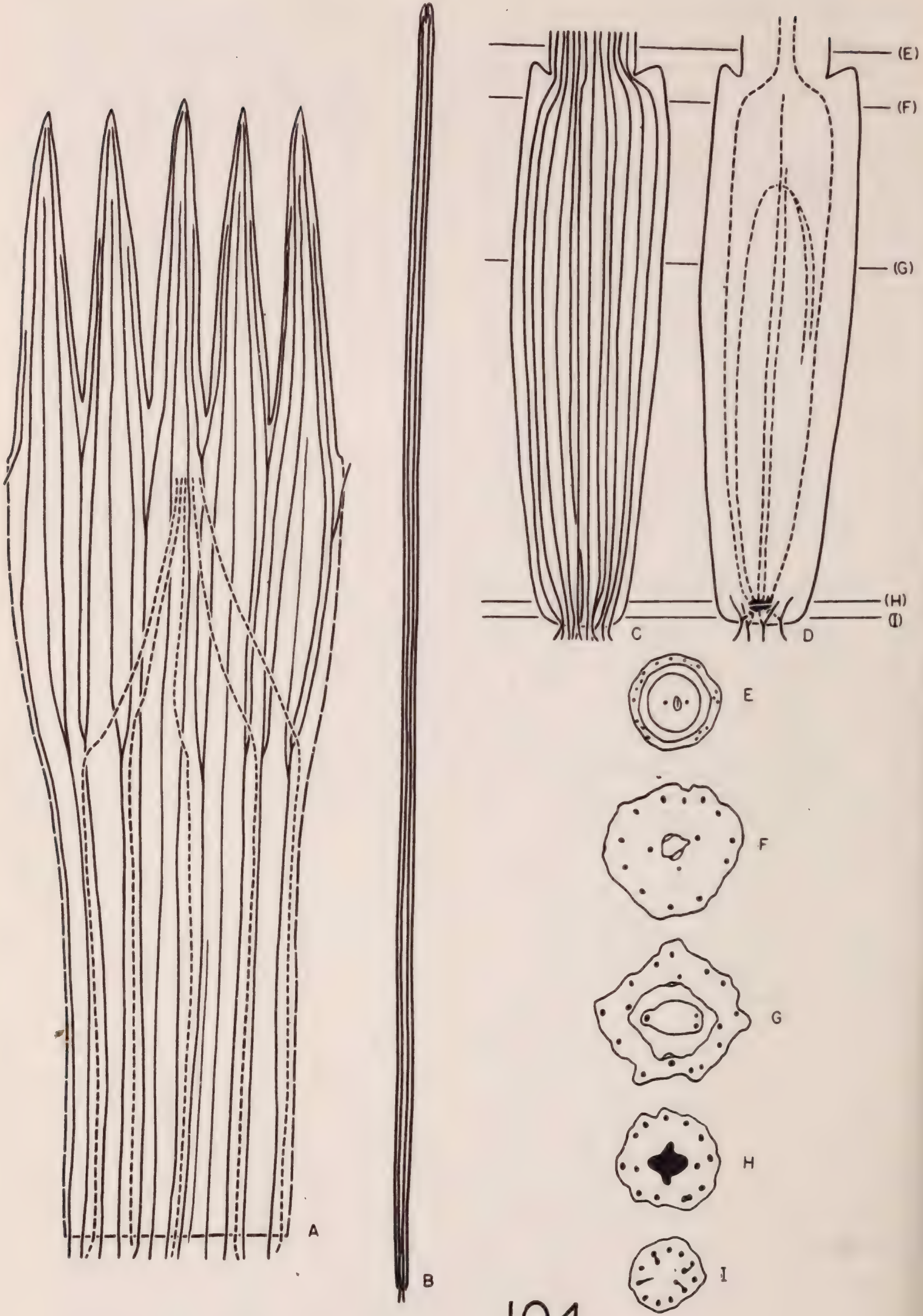

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FIG. 104. *Stenopadus stipitatus* (*Maguire & Maguire 35358*), portions of flower drawn to show venation. A, corolla; B, style; C, achene, showing exterior bundles; D, achene, showing interior bundles; E–I, successive sections of the corolla base and achene at levels indicated by (E) through (I) above. A, B, × 4.5; C–I, × 9.

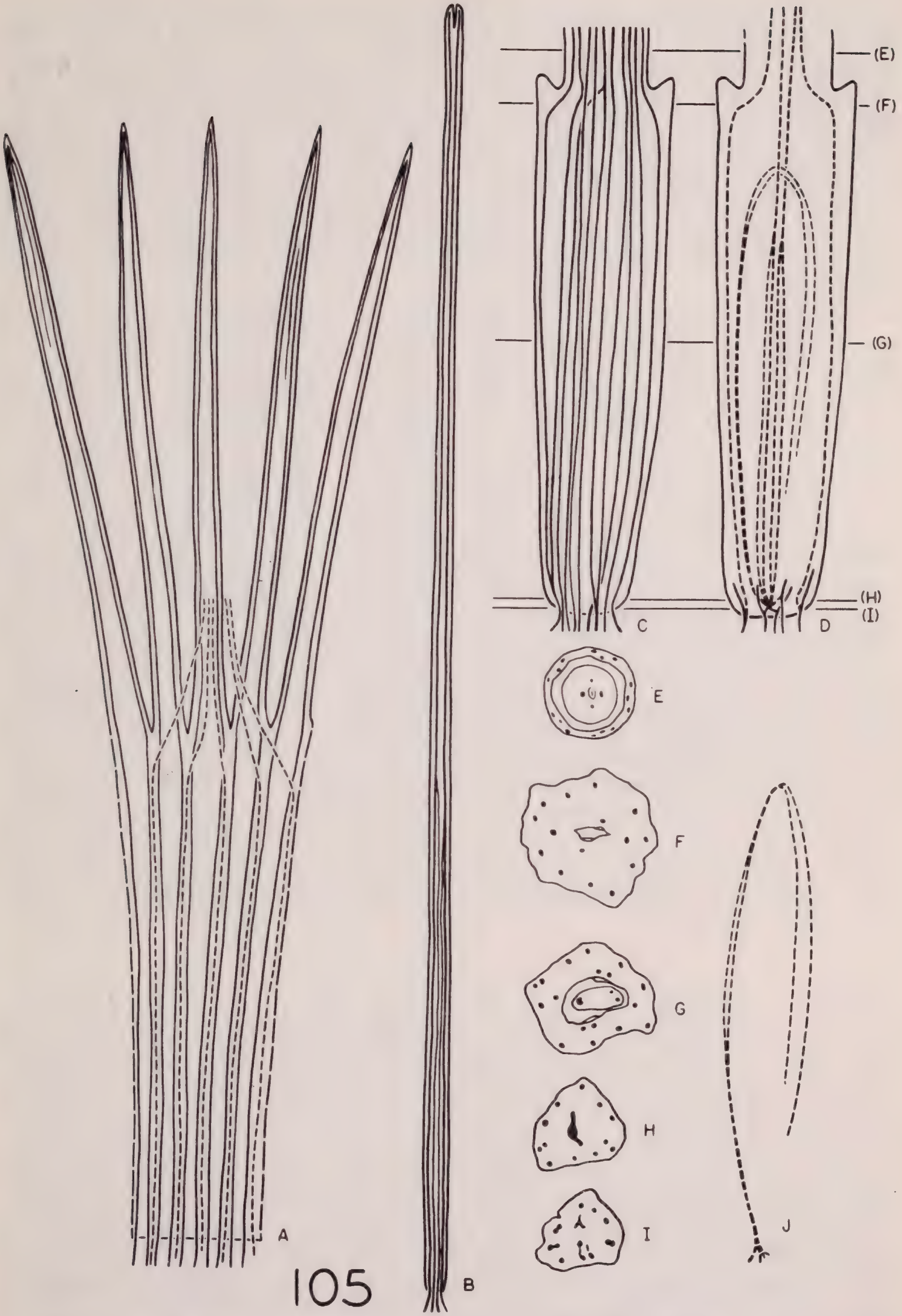

FIG. 105. A–I, *Stenopadus cucullatus* (*Maguire & Maguire 35120*), portions of flower drawn to show venation. A, corolla; B. style; C, achene, showing exterior bundles; D, achene, showing interior bundles; E–I, successive sections of the corolla base and achene at levels indicated by (E) through (I) above; J, *Stenopadus chimantensis* (*Steyermark & Wurdack 652*), ovule trace. A, B, × 4.5; C–J, × 9.

The four style bundles extend from the style into the achene (fig. 105 D) where they become interior bundles (fig. 105 F). The two lateral interior bundles branch in the lower half of the achene (fig. 105 G) so that they are double along part of their extent. The dorsiventral pair of interior bundles connect, at the achene base, with adjacent exterior bundles. The lateral interior bundles, together with the ovule trace, form a plexus (fig. 105 H) which separates lower down (fig. 105 I) to join exterior bundles. A cylinder of bundles connects with receptacle vascular tissue. The ovule trace is dichotomously branched (fig. 105 D, G). For comparison, an ovule trace of *S. chimantensis* is shown in figure 105 J. In the ovule studied of this species, the trace was dual in two places, although single at the base and at the chalaza.

Among the other species of *Stenopadus* for which material was available, *S. chimantensis, S. connellii, S. huachamacari, S. obconicus,* and *S. sericeus* were found to have corolla vasculation like that of *S. cucullatus,* though median bundles were entirely lacking in these species. Median bundles were found in the lobes, though not in the tube, of *S. colombianus* corollas. Two bundles were found in the styles of all of these species, and various numbers (though not fewer than four) interior bundles occurred in the achenes. Ovule traces may or may not be branched in these species. The frequency within the genus of various vascular conditions could not be ascertained from the material available. It is sufficient for the purposes of the present study, however, to note that certain conditions seemingly not present in the majority of mutisioids are prominently represented in *Stenopadus.* These features may be summarized as follows; median veins are present in the corolla in addition to lateral bundles (which branch to form subsidiary bundles in some species); the lateral bundles are not united in the corolla, and may or may not be united in the achene; xylem of stamen traces often terminates freely in the summit of the achene; at least 10 exterior bundles are present in the achene; two, sometimes four, style bundles continue into the achene as interior achene bundles; a dorsiventral pair of interior bundles is always present, and two to several lateral interior bundles are present in the achene; characteristic vascular configurations occur at the base of the achene, in all species forming a cylinder of independent bundles which enter receptacular tissue; the ovule trace is often dichotomously branched, though it may be further ramified or unbranched.

Stifftia.

Before comparing these vascular patterns with the remainder of Guayana Mutisieae composing the basis for this study, a pertinent comparison can be made with the flowers of *Stifftia chrysantha* (fig. 106), which is, like *Stenopadus,* a South American representative of the subtribe Gochnatinae. The corollas of this species (fig. 106 A), often have median veins in addition to the lateral veins; lateral veins do not fuse at the corolla-lobe tips. Median veins, where present, usually extend only part of the length of the corolla, terminating freely above, and only infrequently continuing to the base of the corolla tube. As in the vast majority of Compositae known, though not as in *Stenopadus,* adjacent laterals fuse beneath sinuses of the corolla in *Stifftia chrysantha.* Thus, in the corolla shown, six bundles enter the achene. In addition to the six bundles in the achene continuous with those of the corolla, four others are present, forming a total of ten exterior bundles in the achene wall (fig. 106 C, F). Xylem of stamen traces joins with that of adjacent coralline bundles in the top of the achene. In the style (fig. 106 B) two bundles are present. These continue into the achene as interior bundles

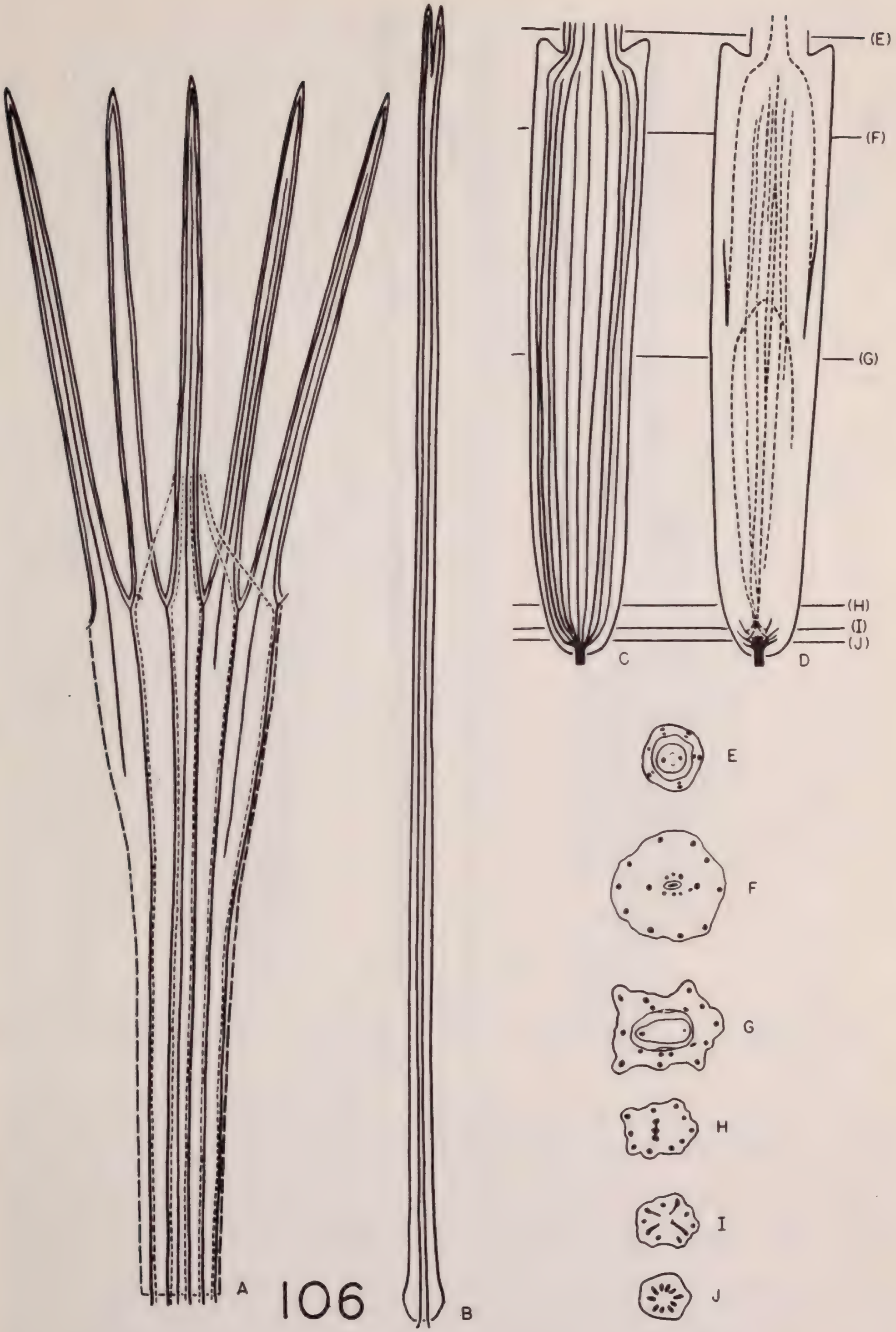

FIG. 106. *Stifftia chrysantha* (Trinidad Botanic Garden 1330; GH), portions of flower drawn to show venation. A, corolla; B, style; C, achene, showing exterior bundles; D, achene, showing interior bundles; E–J, successive sections of corolla base and achene at levels indicated by (E) through (J) above. A, B, × 3; C–J, × 6.

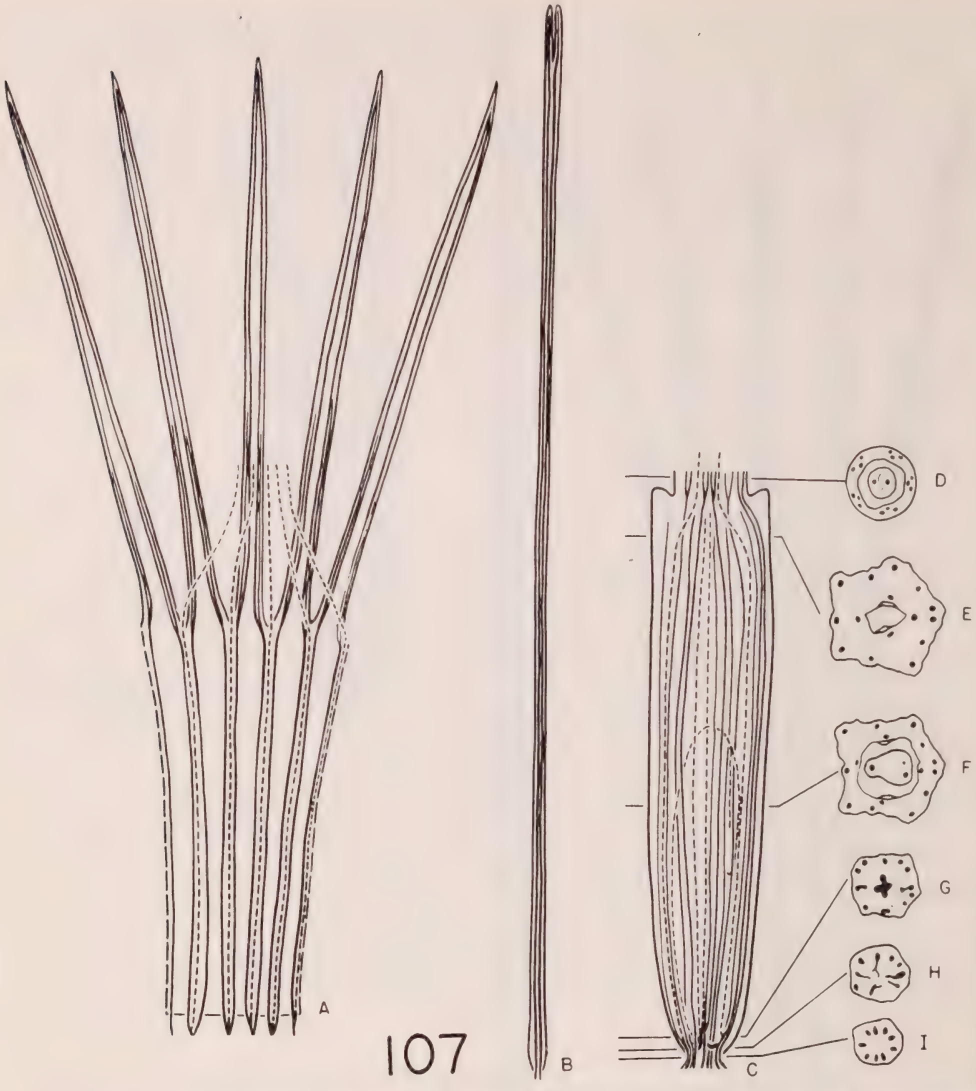

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FIG. 107. *Stomatochaeta crassifolia* (*Cowan & Wurdack 31162*), portions of flower drawn to show venation. A, corolla; B, style; C, achene; D–I, sections of corolla base and achene at the levels indicated. A, B, × 4.5; C–I, × 9.

(fig. 106 D, F), but rather than extending to the base of the achene, they join exterior bundles at various points toward the top of the achene (fig. 106 D). Numerous other interior bundles, which terminate freely above, are present in the achene. Together with the ovule trace, these form, in the achene base, a plexus which separates into branches which join exterior bundles below. The ovule trace is unbranched. At the base of the achene, all of the exterior bundles unite into a single strand of vascular tissue which passes into the receptacle.

The floral vasculation of *Stifftia chrysantha* differs in several features from that of *Stenopadus:* union of laterals beneath the sinuses of the corolla; union of stylar traces with exterior achene wall bundles near the top of the achene; and union of all achene bundles at the base of the achene to form a single strand. Aside from these features, the venation is not unlike that of *Stenopadus,* an interesting similarity being the large number of interior bundles present in the

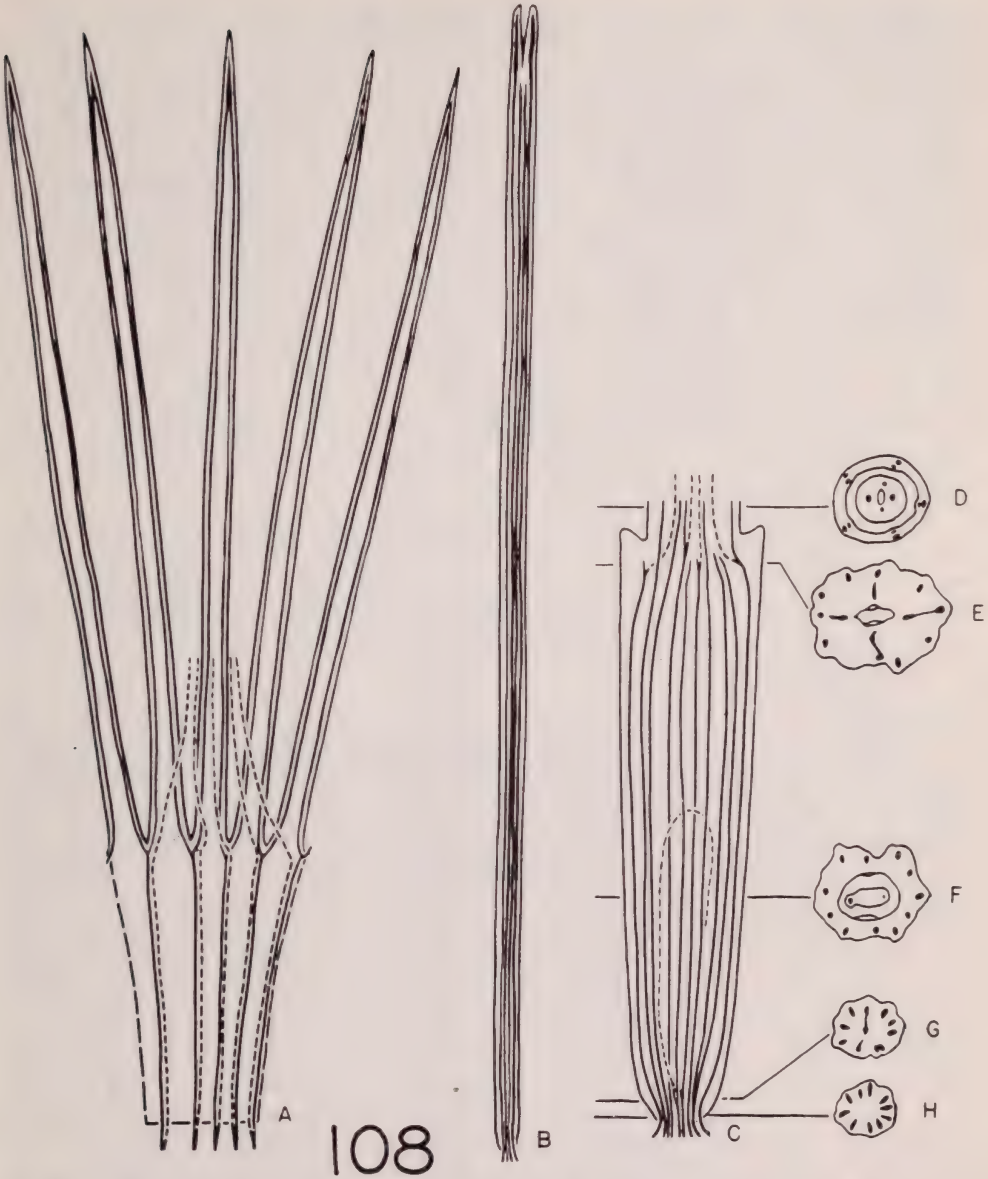


FIG. 108. *Chimantaea rupicola* (*Steyermark & Wurdack* 748), portions of flower drawn to show venation. A, corolla; B, style; C, achene; D–H, sections of corolla base and achene at levels indicated. A, B, × 4.5; C–H, × 9.

achene. The venation of *Stifftia uniflora* was found to be like that of *S. chrysantha*, with the exception that no median veins were found in the corolla of *S. uniflora*.

Stomatochaeta.

The other genera of Gochnatinae considered here, *Stomatochaeta, Chimantaea*, and *Quelchia*, have some features seen in *Stenopadus* and *Stifftia* but are simpler in most features of floral vasculation. In the genus *Stomatochaeta, S. crassifolia* (fig. 107) shows a representative condition. The corollas (fig. 107A) have lateral veins which join at the tip of each lobe. In addition, subsidiary bundles, as in *Stenopadus kunhardtii*, branch from the laterals near the sinuses and extend for a distance up the lobes, terminating freely. No median veins are present. In the top of the achene (fig. 107 C), the pairs of adjacent laterals unite. Xylem of stamen traces often unites with that of laterals in the summit of the achene. In addition to the five bundles in the achene connected directly with corolla bundles, five other exterior bundles are present (fig. 107 C). These run from a plexus at the achene top to the base of the achene. The style of *Stomatochaeta crassifolia* contains two bundles (fig. 107 B). These enter the achene as a dorsiventral pair of interior achene bundles (fig. 107 C). In addition, a lateral pair of interior bundles is present in the achene (see also fig. 107 E, F). Near the base of the achene, the dorsiventral interior bundles unite with nearby exterior bundles (fig. 107 G), while the lateral pair forms a plexus with the ovule traces. At a lower level, this plexus of vascular tissue is broken up into strands which join exterior bundles (fig. 107 H). A cylinder of bundles enters the receptacle (fig. 107 I). In the configuration of vasculation at the achene base, *Stomatochaeta crassifolia* shows considerable resemblance to species of *Stenopadus*, *S. cucullatus* for example. The ovule trace in the specimen examined was found to be dichotomously branched (fig. 107 C).

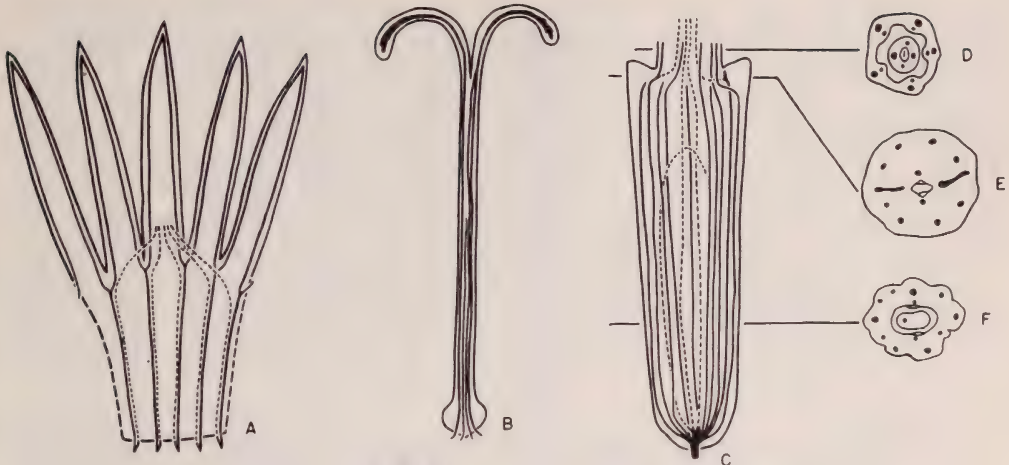
The other species of *Stomatochaeta* examined, *S. condensata*, *S. cylindrica*, and *S. cymbifolia*, agreed with the pattern described for *S. crassifolia* except that subsidiary bundles were not found in corollas of these species; they are often not present in *S. crassifolia*. Likewise, an unbranched ovule trace, seen in *S. crassifolia* in addition to the dichotomous condition, was seen in material of these species.

Chimantaea.

Although flowers of *Chimantaea* resemble those of *Stomatochaeta* closely in gross morphology and indument, they differ significantly in details of venation. Typical of the genus *Chimantaea* is *C. rupicola* (fig. 108). In the corollas of this species (fig. 108A), only lateral veins are present in the lobes. These fuse at the lobe apices; in addition, adjacent laterals fuse beneath the sinuses, a feature not seen in *Stomatochaeta*. Thus five corolla bundles, together with adjacent stamen traces (fig. 108D) enter the achene. Stamen traces join with these fused laterals in the achene top. In addition to the five corolline bundles, five other exterior bundles are usually found in the achene wall (fig. 108C). In the style (fig. 108B), the dorsiventral pair of bundles is present; a lateral pair of smaller bundles runs from just below the point of bifurcation of the stigmatic branches to the base of the style. The four (sometimes five) bundles of the style connect with exterior bundles only a short distance beneath the top of the achene (fig. 108C, E). Thus, in contrast to the taxa above, only exterior bundles are found in most of the length of the achene. The ovule trace is simple; at its base, its vascular supply divides to join exterior bundles (fig. 108G). At the base of the achene, as in *Stenopadus* and *Stomatochaeta*, a cylinder of vascular bundles (fig. 108H) enters the receptacle. Specimens of other species of *Chimantaea* (*C. lanocaulis*, *C. mirabilis*) showed a venation pattern identical to that described above for *C. rupicola*.

Quelchia.

A flower of *Quelchia cardonae* is seen in fig. 109. The corolla of this species (fig. 109A), like that of *Chimantaea rupicola*, exhibits a simplicity in structure which equals that found in the majority of Compositae. In the lobes, only lateral veins are found; these fuse beneath the sinuses and at the lobe tips. Thus five bundles and their associated stamen traces, which join with the corolla bundles in



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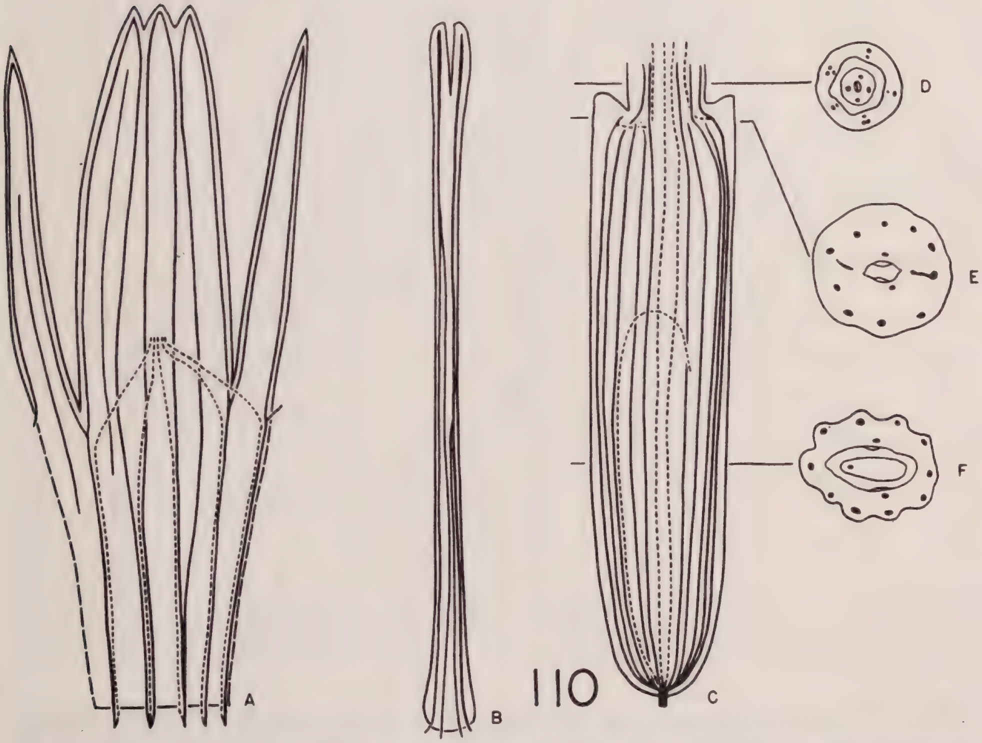

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FIG. 109. *Quelchia cardonae* (*Pinkus 112*), portions of flower drawn to show venation. A, corolla; B, style; C, achene; D–F, section of corolla base and achene at levels indicated A, B, × 4.5; C–F, × 9. FIG. 110. *Neblinaea promontorium* (*Maguire, Wurdack & Bunting 37016*), portions of flower drawn to show venation. A, corolla; B, style; C, achene; D–F, sections of corolla base and achene at levels indicated. A, B, × 4.5, C–F, × 9.

the achene top, enter the achene (fig. 109 C). Five other bundles, terminating upwardly at the achene top, are also present as exterior bundles in the achene. The style (fig. 109 B) contains the usual dorsiventral pair of bundles. At lower levels in the style, a pair of lateral bundles also is found, however. These four style bundles enter the achene (fig. 109 C); the dorsiventral pair unites with exterior bundles a short distance below the summit of the achene (fig. 109 E). The lateral pair continue down the achene as interior bundles (fig. 109 E, F). Near the base of the achene, the interior bundles fuse with the ovule trace; this grouping joins at the base of the achene a grouping formed from the exterior bundles. A single vascular strand connects the achene vascular tissue with that of the receptacle. Specimens examined of other species of *Quelchia, Q. conferta, Q. eriocaulon*, and *Q.* × *grandifolia*, were found to have a floral venation identical to that seen in *Q. cardonae*.

Neblinaea.

A number of similarities may be found between those genera of the present study having actinomorphic corollas (Gochnatinae) and those possessing bilabiate corollas (Gerberinae). Flowers of *Neblinaea* (fig. 110) are exemplary in this respect. Corollas of the only species, *N. promontorium* (fig. 110A), show lateral bundles in the two free lobes. It is of considerable interest to find that the lateral bundles of the three united lobes are not united as they are in bilabiate flowers of more advanced Mutisieae, such as are described below. The two pairs of adjacent "laterals" of this portion of the corolla fuse in the basal portion of the corolla, or in the achene top. Beneath the three sinuses beside the two lobes which are not united, however, the laterals fuse immediately below the sinuses. In addition to the full representation of lateral bundles in this corolla, median bundles are occasionally found either in the strap-shaped portion of the corolla or in the lobes which are separate. These median bundles terminate freely at both ends and extend only a short distance into the corolla tube. Stamen traces unite with corolla bundles in the top of the achene. As in the three preceding genera, ten bundles are present in the achene (fig. 110 C), five of these being additional to those connected to corolla bundles. As in *Quelchia,* four bundles are present in the style (fig. 110 B); the two lateral style bundles fuse with the dorsiventral pair at various points above the base. The achene structure is also identical to that of *Quelchia* in that the dorsiventral style bundles fuse with external achene wall bundles in the achene top (fig. 110 E), while the lateral style bundles continue into the achene as interior bundles accompanying the bands of stigmatoid tissue. The fusion of all bundles into a single strand of vascular tissue at the base of the achene is also like the condition found in *Quelchia.* The similarities of floral venation between *Quelchia* and *Neblinaea* are not cited here to suggest a close relationship between these genera. Rather, simplifications (as compared to genera described above) such as they show may occur independently.

Gongylolepis

The genus *Gongylolepis* is interesting to compare with *Neblinaea* in that although the flowers of most species are much larger than those of *Neblinaea,* their flowers do not have more complex venation; in fact, their pattern is often simpler than that just described. In *Gongylolepis bracteata* (fig. 111) the condition might be interpreted as basic for the genus, though it is not the most typical. In the corollas (fig. 111A) of this species lateral veins are present, fusing at the lobe-tips both in the two separate lobes and the three united lobes. The latter portion of the corolla exhibits a very interesting condition (mentioned

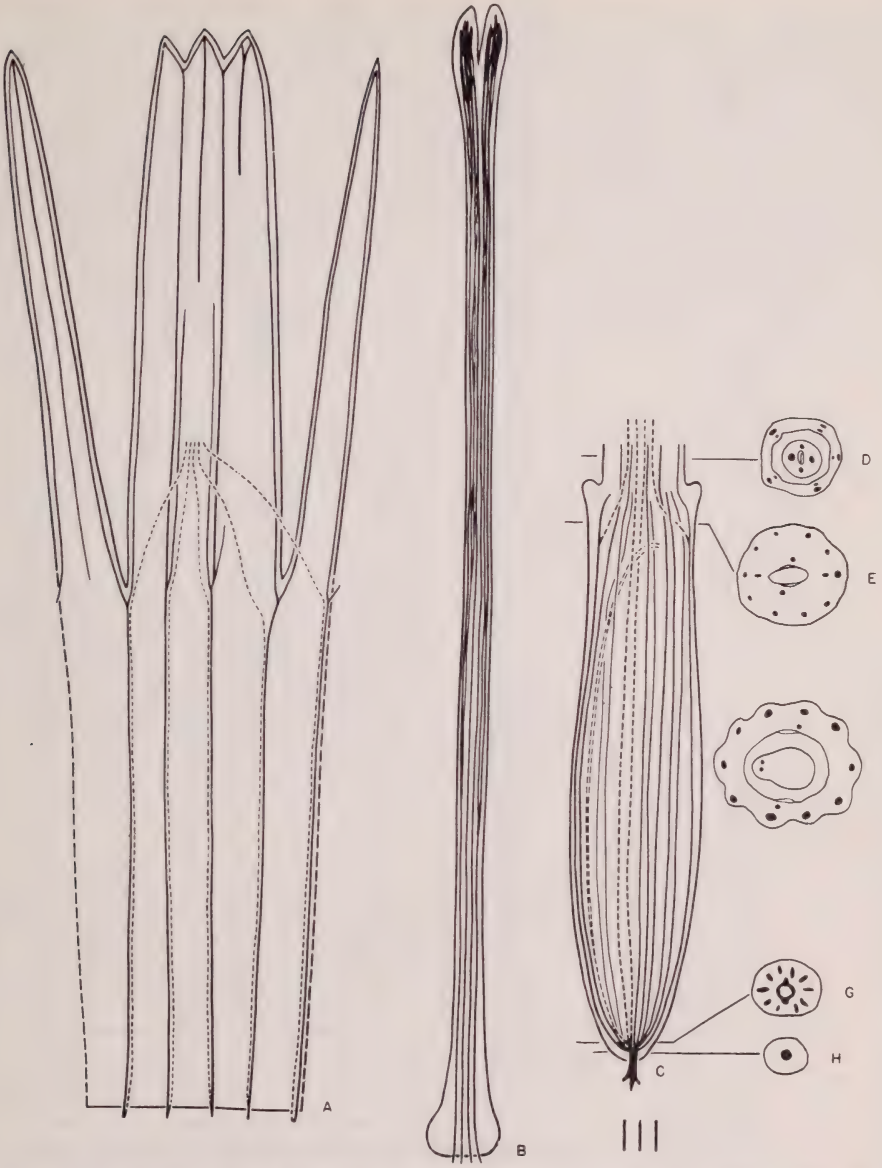


FIG. 111. *Gongylolepis bracteata* (*Maguire 27560*), portions of flower drawn to show venation. A, corolla; B, style; C, achene; D–H, sections of corolla base and achenes at levels indicated. A, B, × 4.5; C–H, × 9.

also in *Neblinaea*) in that although the laterals unite beneath the very short sinuses of this structure, freely terminating "lateral" bundles are also present further down, branching from the two central veins *at the same level as the division of laterals below sinuses beside the two separate lobes.* It is possible, therefore, to interpret this condition as a reflection of the vascular system of the actinomorphic corolla which is generally assumed to be ancestral to the zygomorphic condition. Further emphasizing a possibly primitive configuration, median bundles are often present for varying distances in the lobes of this species. In the tubular portion of the corolla, only five bundles, together with their associated stamen traces, are present. Stamen bundles unite with these corolla bundles in the achene top. In addition to the corolline bundles, five more exterior bundles are found in the achene wall (fig. 111 C, F). The style of *Gongylolepis bracteata* (fig. 111 B) has four bundles at the base (fig. 111 D). In its upper portions, however, the bundles branch and anastamose, forming a more complex appearance; these groups of bundles are arranged on adaxial and abaxial sides of the style, and pass into the stigmatic branches. In the achene (fig. 111 C), the dorsiventral style bundles unite with exterior achene wall bundles on opposite sides of the achene. The lateral style bundles continue down the achene as interior bundles (see also fig. 111 F). Near the base of the achene these bundles unite with the ovule trace (fig. 111 G) to form a cylindrical plexus. Further down, this joins with the exterior bundles to form a single strand which connects with the receptacle. The ovule trace was found to be dual along most of its length.

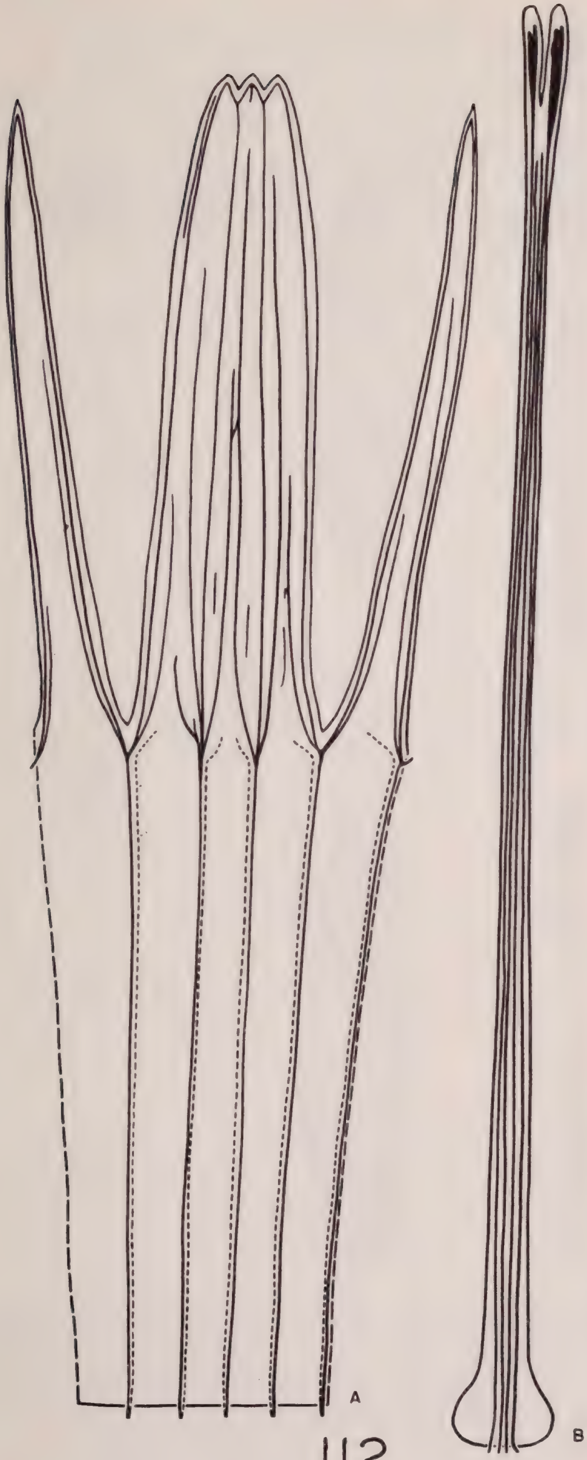
The drawing of *Gongylolepis pedunculata* (fig. 112) shows the only species of this genus studied in which a more complex corolla venation was found. In certain features it is like the condition in *G. bracteata.* A median vein, for example, is present for most of the length of the strap-like portion of the corolla. As in *G. bracteata,* two prominent veins from "laterals" beside the central two veins which run the length of this structure. These branch at the same level as the veins subtending sinuses beside the separate lobes. In addition, other veins branch off from the five main corolla-tube veins at this level. The shorter, freely terminating branches, unlike those of *Stenopadus kunhardtii* or *Stomatochaeta crassifolia,* are located inside, rather than outside, the true laterals. The style of *G. pedunculata* (fig. 112B) is simpler than that of *G. bracteata* in that only four bundles, all of which terminate freely, are found. The achene venation is like that of *G. bracteata.* The greater complexity of the corolla venation in *G. bracteata* may be correlated with the fact that this species has the largest flowers of the species of *Gongylolepis* studied.

The smallest-flowered species, *G. fruticosa,* (fig. 113), has been included for comparison. In the corolla of this species (fig. 113 A), the venation has reached the ultimate simplicity found in most zygomorphic corollas of Mutisieae. The laterals fuse directly beneath the sinuses, and no corolla veins are found in addition to the fused laterals. In the achene (fig. 113 C) the five corolline bundles are augmented, as in *G. bracteata,* by five more bundles, which terminate in the top of the achene. In the style of the flower of *G. fruticosa* studied (fig. 113 B), four bundles were present, though only three of these extended to the style base. In the achene (fig. 113 C), these were found to join achene wall bundles at a high level of the achene. Thus only exterior bundles were present in most of the length of the achene. A simple ovule trace is present; all the bundles of the achene unite at the achene base into a single strand of vascular tissue.

Despite the fact that their corollas are larger than those of *G. fruticosa,* the same corolla venation was seen in *G. huachamacari, G. martianus,* and *G. paruana.* The styles were all found to have four bundles; a pair of lateral interior bundles were usually not observed in achenes of these species, all the stylar bundles uniting with achene wall bundles at the summit of the achene. The ovule trace was often seen to be dual, at least in its upper portion.

Explanation of Figures 112–113

FIG. 112. *Gongylolepis pedunculata* (*Cowan & Wurdack 31131*), portions of flower drawn to show venation. A, corolla; B, style. × 4.5. FIG. 113. *Gongylolepis fruticosa* (*Steyermark & Wurdack 1136*), portions of flower drawn to show venation: A, corolla; B, style; C, achene. A, B, × 4.5; C, × 9.



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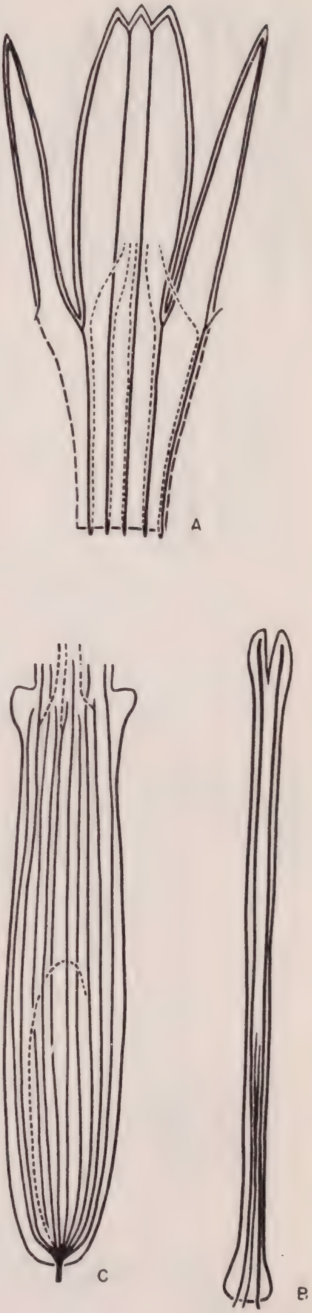

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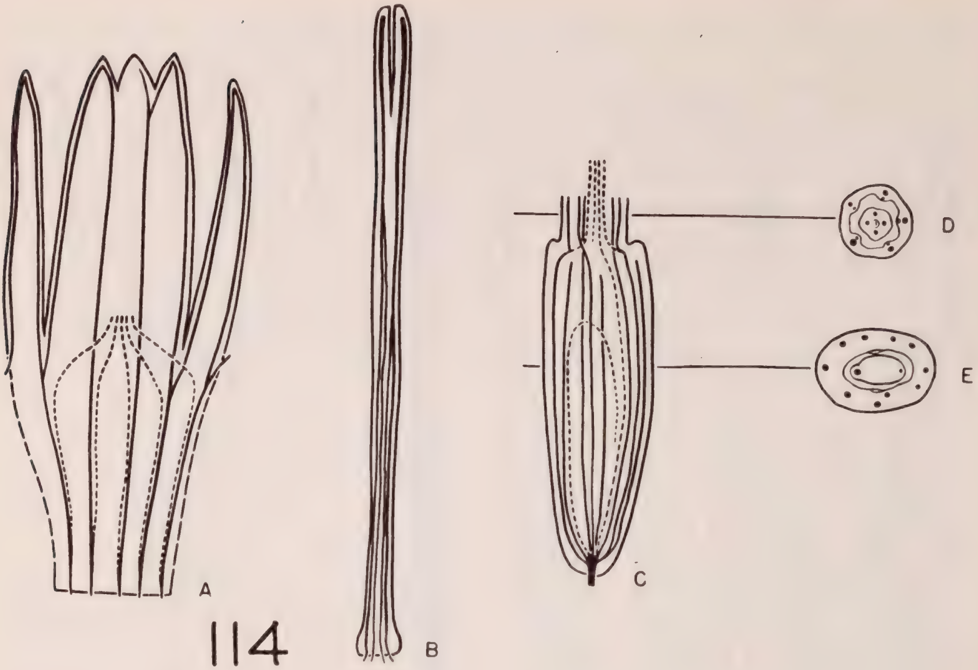

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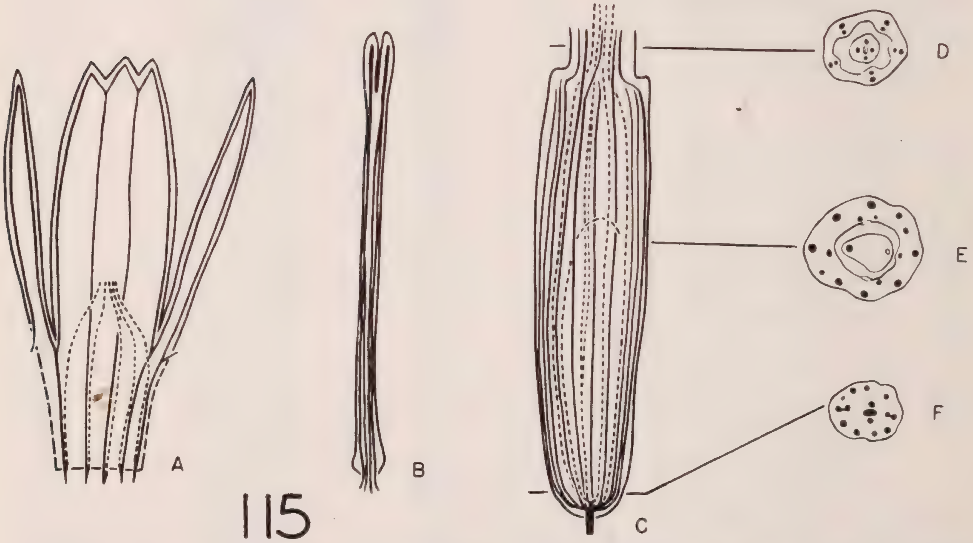

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FIG. 114. *Duidaea tatei* (*Steyermark 58204*), portions of flower drawn to show venation. A, corolla; B, style; C, achene; D–E, sections of corolla base and achene at levels indicated. A, B, × 4.5; C–E, × 9. FIG. 115. *Achnopogon virgatus* (*Steyermark & Wurdack 742*), portions of flower drawn to show venation. A, corolla; B, style; C, achene; D–F, sections of corolla base and achene at levels indicated. A, B, × 4.5; C–F, × 9.

Duidaea.

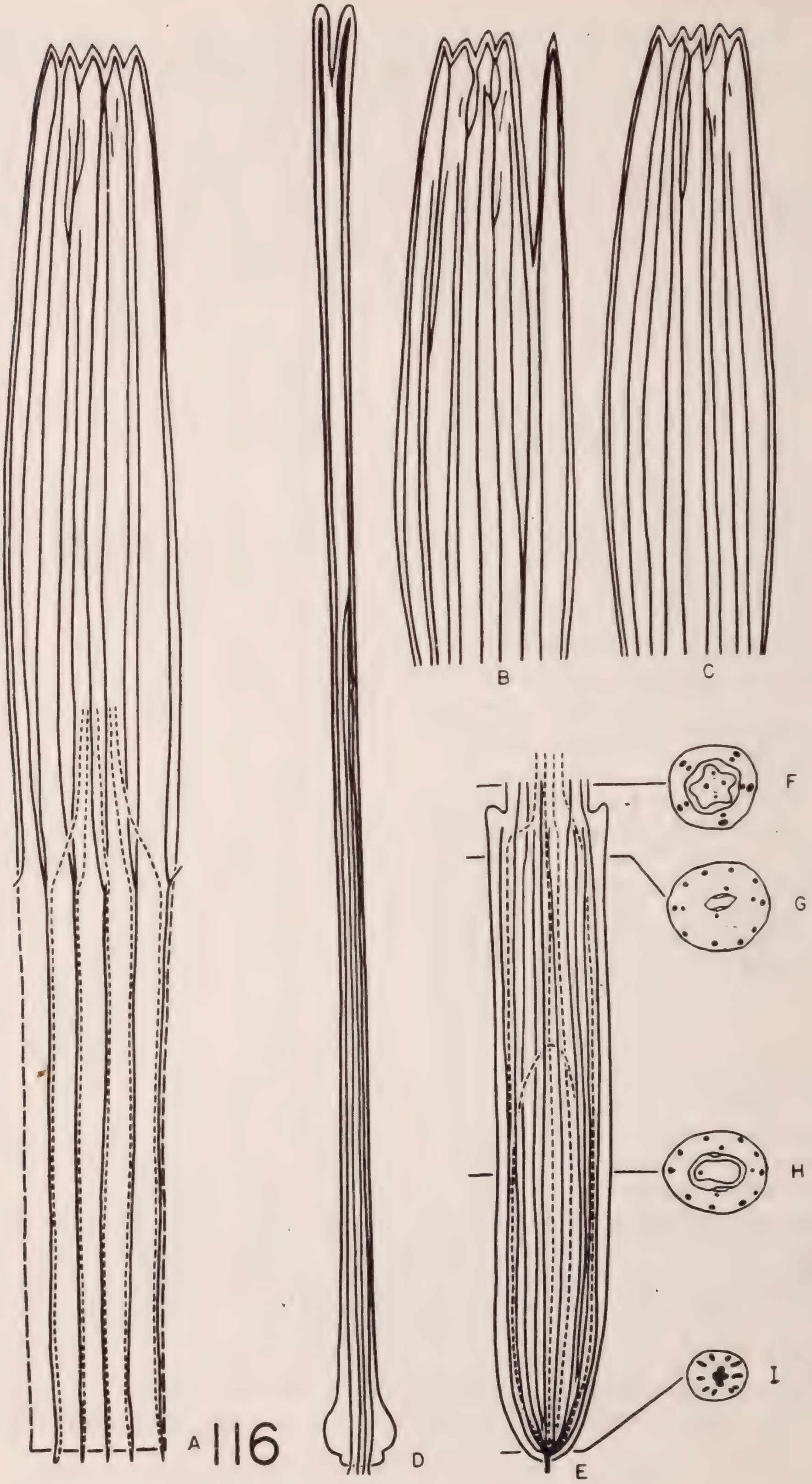
Portions of a flower of *Duidaea tatei* are shown in fig. 114. The corollas of this species (fig. 114A) exhibit the simplified type described above for *Gongylolepis fruticosa.* Although the five corolla-tube veins continue into the achene, fewer than five additional exterior bundles may be present (fig. 114 C, E). Stamen traces unite with the associated corolla veins in the corolla-tube. In the style (fig. 114 B) four bundles are present. The dorsiventral pair of these unites with achene wall bundles in the achene summit. In the flower studied, only one of the lateral bundles was seen to form an interior bundle in its extension into the achene. A simple ovule trace is present, and all of the bundles in the achene unite at the base into a single strand. *Duidaea pinifolia* was found to have a vasculation pattern like that shown for *D. tatei.*

Achnopogon.

The corolla of the monotypic genus *Achnopogon* (fig. 115 A), like that of *Duidaea,* has a simplified venation. In the achene, the full complement of ten bundles is present, half of them continuing upwards into the corolla-tube. Stamen traces unite with the corolla-tube bundles in the achene top. In the style of *Achnopogon* (fig. 115 B), as in that of *Duidaea tatei*, four bundles are present, the lateral two uniting with the dorsiventral pair at various points along the length of the style. Rather than joining with exterior achene wall bundles, however, all four continue into the achene as interior bundles. (fig. 115 E). In the achene illustrated, one of the lateral interior bundles is double along part of its extent. At the base of the achene, the dorsiventral pair of interior bundles unites with nearby exterior bundles, while the lateral interior bundles and the ovule trace unite as a central plexus; this plexus joins, further down, with the single strand formed by the union of all of the exterior bundles.

Glossarion.

Flowers of the monotypic genus *Glossarion* (fig. 116) are of particular interest in that they are ligulate in form, all the lobes being united except at the tips (fig. 116 A–C). Although the lobes are histologically united, the vascular anatomy suggests that the corolla form is basically actinomorphic, with some degree of modification. As the corolla in figure 116 A shows, some of the lateral veins unite beneath the short sinuses at the "ligule" tip. It seems significant, however, that each of the five veins of the corolla-tube divides into two laterals at the same level as the vein beneath the single deep sinus in the corolla. Portions of two other corollas are shown (fig. 116 B, C) to indicate the variation in venation at the corolla tip. In each of these, however, ten laterals are present in the more basal portion. Occasionally one of the outer lobes may be separate for a short distance (fig. 116 B). The vascular pattern of the corolla, then, shows little modification from an actinomorphic form, although the tissues between these lobes are continuous. This is a stage in union of corolla lobes beyond that found in *Fitchia* (Carlquist 1957b), where sinuses are histologically formed between the lobes, although only the adaxial sinus usually opens during anthesis. Stamen traces unite with their associated corolla bundles in the achene top. In addition to the five exterior bundles, which continue into the corolla, five additional bundles, terminating at the achene summit, form the complement of ten exterior achene bundles (fig. 116 E). The style of *Glossarion* (fig. 116 D) contains four bundles, uniting to two above. These four bundles continue downward into the achene as interior bundles. Occasionally one of the dorsiventral interior bundles may unite with a nearby exterior bundle (fig. 116 H). The lateral pair, however,


A
116
B
C
D
E
F
G
H
I

follow the bands of stigmatoid tissue to the base of the achene, uniting with the ovule trace (fig. 116 I). A single vascular strand results from the union of all of the bundles at the achene base. The ovule trace is simple.

DISCUSSION

The floral vascular patterns given above serve as additional taxonomic criteria in separating the genera of Guayana Mutisieae investigated in the present study. The segregation of *Stomatochaeta* and *Chimantaea* from *Stenopadus* is justified by the differences found in floral venation among these genera. *Quelchia* is distinct from these genera in certain details, though similar in most respects. Within the Gerberinae studied in this paper, simplification from the patterns seen in *Neblinaea* and *Gongylolepis bracteata* is seen in other species of *Gongylolepis*, such as *G. fruticosa*, *Duidaea*, and *Achnopogon*. This is in accord with the suggestion of Maguire (1956; and Maguire & Wurdack 1957) that these latter taxa are advanced derivations from a gongylolepoid stock. The anamalous corolla form of the genus *Glossarion* is clarified by study of the underlying venation pattern. As stated by Maguire and Wurdack (1957), this ligulate corolla form seems to be a modification of a basically actinomorphic form.

The differences in floral venation described above are significant in that they suggest evolutionary trends within the Mutisieae. As indicated by Maguire (1956), the genera of Guayana Mutisieae considered here represent not only a geographical assemblage of genera, but also a series of primitive forms in the two subtribes concerned, Gochnatinae and Gerberinae. Since the Gochnatinae are generally considered to contain the most primitive features to be found in the Mutisieae as a whole, the characters of Guayana Gochnatinae become of interest in attempting to deduce primitive structural features in Compositae at large. The introduction of *Stifftia*, a member of Gochnatinae occurring outside the limits of Guayana, into this study was intended to demonstrate the most primitive floral venation pattern which could be found in non-Guayana Gochnatinae.

It seems apparent that the vascular characters described above cannot be arranged in a single line from complex to simple. In such species as *Stenopadus kunhardtii* and *Gongylolepis pedunculata*, it seems probable that increase in number of vascular bundles from the basic condition has taken place. However, the following possible sequences in the evolution of the Mutisioid flower may be suggested:

(1) Corolla. Median veins in corolla-lobes of Mutisieae have been regarded as primitive in the genus *Anastraphia* (currently treated as *Gochnatia*) by Koch (1930a); a similar interpretation was given from *Hesperomannia* (Carlquist 1957a). The progressive loss of median bundles may be regarded as an indication of advance. It may be that the close relation between stamen traces and lateral bundles provides an explanation for the discarding of median, rather than lateral bundles in the vascular simplification of the composite flower. It seems likely that separate pairs of laterals in the corolla-tube have preceded united lateral bundles. In some *Stenopadus* species considered here such adjacent lateral bundles were often not united even in their downward extension into the achene.

Explanation of Figure 116

FIG. 116. *Glossarion rhodanthum* (*Maguire, Wurdack & Bunting 37190*), portions of flowers drawn to show venation. A, corolla; B, C, upper portions of corollas of other flowers; D, style; E, achene; F–I, sections of corolla base and achene at levels indicated. A–D, × 4.5; E–I, × 9.

It is difficult at present to suggest whether the subsidiary bundles, such as occur in corollas of *Stenopadus kunhardtii, S. stipitatus,* and *Stomatochaeta crassifolia,* represent features of a primitive venation pattern or are secondary additions.

In the zygomorphic corolla of Geberinae, union of the abaxial three lobes has involved the reduction from pairs of laterals to single bundles in the united portion. Stages in this simplification are offered by *Neblinaea* and two species of *Gongylolepis.* The final simplified form was described by Koch (1930a,b) in *Perezia microcephala* and *Mutisia taraxacifolia,* although she suggests no stages in its origin.

The genus *Glossarion* appears to represent a special case in which the lobes of an actinomorphic flower have united without any great alteration of the vascular system.

(2) Achene. In the achenes of *Stenopadus kunhardtii, S. stipitatus,* and *S. cucullatus,* adjacent laterals continue downward without fusing (although a vascular plexus often interconnects many of these bundles at the achene top). In most of the taxa considered here, however, the pairs of laterals unite in the achene top and continue downward as five of the exterior achene wall bundles. Ten bundles are very commonly present in flowers showing this condition, and the additional five bundles are accounted for by continuation of median corolla veins into the achene, as in *Stenopadus campestris.* Very often, however, median bundles are not present in the corolla, or present only as isolated portions in the lobes. The presence of additional bundles in the achene may then be accounted for by preferential retention of bundles in the achene, although their upward extension as median traces has been lost phyletically in the corolla. Koch (1930b) described the achene anatomy for Mutisieae only in an advanced form, *Mutisia taraxacifolia,* in which the bundle number in the achene was reduced to five. The presence of ten bundles in achenes of Mutisieae has been described previously by Giroux (1937) in *Dicoma tomentosa.*

The reader will have noted that a difference occurs between the genera *Stenopadus, Stomatochaeta,* and *Chimantaea,* and the remaining genera in this study in the configuration of bundles at the achene base. In the three genera named a cylinder of independent bundles enters the receptacle, while in the others all the achene bundles fuse to a single strand. Snow (1945) has asked, quite appropriately, why there should be a single vein supplying the base of the achene in the Compositae she investigated, rather than a floral stele consisting of several bundles, such as is found in flowers of other families. This question can be answered by saying that consistent reduction in the vascularization of the composite flower has resulted in this simplified situation, but the presence of an actual cylinder of bundles in the taxa named shows that such a condition is indeed present in primitive Compositae.

Apparently the pappus of the Mutisieae investigated here is advanced compared with that of primitive Heliantheae, and although many of the pappus bristles are quite thick and contain some degree of differentiation among cells in their interior, there are no vascular elements present in the pappus. However, the fact that phloem strands may be seen to lead out to the pappus base in several of the genera (particularly *Glossarion* and *Gongylolepis*) could be used in support of the idea that the pappus was primitively a calycine structure more nearly like that shown by certain primitive Heliantheae.

(3) Style and carpels. Because in flowers of Mutisieae or other Compositae described heretofore only a single circle of bundles has been found in the achene,

no suggestions have been made previously concerning the primitive carpellary structure in Compositae. One might expect that the ancestral condition for Compositae would have an interior set of bundles, representing carpellary vascular supply, as well as an exterior set representing that of perianth parts, as well as of the stamens. As the descriptions in the main body of this paper indicate, this is indeed the case in the majority of these Guayana Mutisieae. Furthermore, it is interesting that many of these genera show a characteristic grouping of these bundles at the base of the achene. The dorsiventral pair—representing the main stylar traces, and homologous to median traces of the carpels supposed to have been primitively present in Compositae by Eichler (1875)—often join exterior bundles, which form a plexus at the base of the ovule trace. The large number of lateral interior bundles in some of the taxa considered here (*Stenopadus kunhardtii,* for example) may represent a secondary increase in the number of such bundles, but the frequent presence of a lateral pair as well as a dorsiventral pair suggests that at least these four may have been present primitively.

A functional correlation might explain the fact that lateral interior bundles often closely accompany the two bands of stigmatoid tissue on the interior of the achene wall. The double nature of these lateral interior bundles beside stigmatoid tissue in several of the taxa described here (see *Stenopadus cucullatus,* for example) may be a further suggestion of a two-carpellate condition. Some lateral bundles often develop phloem only, suggesting (as in filaments of many Compositae) that loss of xylem precedes loss of phloem in the progressive reduction of vascular tissue.

In the Heliantheae, the writer (Carlquist 1957b) proposed that the presence of four bundles in the style represents a primitive condition. The connection of the style bundles to interior, or carpellary, bundles in the achenes of Mutisieae would seem to substantiate this suggestion. Differential loss of vascular tissue in different parts of the flower could explain why lateral carpellary bundles may be present in some of the taxa studied here (*Stenopadus,* for example) without lateral style bundles. *Stenopadus cucullatus* would represent a species in which this reduction has not occurred.

Also on the basis of study of primitive Heliantheae, the writer considered that a dichotomous ovule trace might be a primitive character, and that ancestrally two ovules may have been present. The frequent occurrence of a dichotomous ovule trace in the Mutisieae studied here would seem to offer an additional instance of this condition. The elaborately branched ovule trace of *Stenopadus kunhardtii,* however, is probably best interpreted as a secondary increase in the vascularization of the ovule.

The vascular patterns described above would seem to require an explanation in evolutionary terms, and other studies are desirable in supplying a comprehensive picture of evolution in the primitive Compositae. The writer wishes to emphasize the agreement between data from gross morphology assembled by Maguire and his colleagues and the anatomical descriptions given here. Further studies, particularly on stem and wood anatomy, are planned to aid in the development of a thorough understanding of this group.

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BOTANY OF THE PHELPS' VENEZUELAN GUAYANA EXPEDITIONS—II[32]
UAIPAN-TEPUI, ESTADO BOLIVAR

Bassett Maguire and John J. Wurdack

Part II of our reports on the Phelps' Guayana expeditions deals with some of the plants collected on Uaipán-tepuí by Kathleen D. Phelps and Charles B. Hitchcock during January 15–February 15, 1948.

Numbers indicating the cited exsiccatae are those of Phelps and Hitchcock unless otherwise indicated.

VELLOZIACEAE

Barbacenis uaipanensis Maguire, sp. nov. (Fig. 117.)

Caudex simplex erectus, 3–5 dm longus ca. 1.5 cm crassus, vaginis laevibus tecte adpressis imbricatis persistentibus; laminis 3–5 cm longis rosulatis, deorsum 5–7 mm latis, anguste lineari-lanceolatis acutissimis conspicue 5–7–nerviis, subtus inter nervos glanduloso-punctatis; floribus terminalibus numerosis 25 vel pluribus, sessilibus vel subsessilibus; bracteis foliaribus 2–3 cm. longis, chartaceis prominenter 15–20–nerviis, floribus plus-minus longioribus; segmentis perianthii anguste lanceolatis, 8–10 mm longis, tubo 8–10 mm longo; staminibus 6; ovario ca. 10 mm longo 3 mm crasso, obscure trigono glabro, intus nigro; seminibus 2–3 mm longis, fusiformibus albidis medio affixis.

TYPE: erect, post-flowering, locally common, occurring to the exclusion of other flowering plants, embedded in moss and wet humus, windy exposure, summit of Uaipán-tepuí, Bolívar, Venezuela, at 1900 m alt., January 27, 1948, *388* (NY).

Our plant, because of its six stamens, is referred to the genus *Barbacenia.* This is in accord with the distinction made by Pax[33] placing the members of this remarkable family with 6 stamens in the genus *Barbacenia,* and those with stamens more than 6 (usually 15, 18, 24, or 30) in the genus *Vellozia;* and is further in accord with the treatment of Henrard[34], vigorous student of American Velloziaceae.

Barbacenia, as so determined, is apparently otherwise unrecorded for the Guayana Highland. Its closest relative in this area is the widespread *Vellozia alexandrinae* (Schomb.) Goeth & Henrard, characteristic of submontane savannas and montane slopes, particularly as concomitant with or sequential to fire.

ROSACEAE

Licania hitchcockii Maguire, sp. nov. (Fig. 118.)

Arbor parva; ramulis teretis tenuibus puberulis; foliis 4–5 cm longis 2.5–3.0 cm latis (superioribus minoribus 1.0–2.5 cm longis 0.5–1.5 cm latis), elliptico-ovatis vel elliptico-obovatis breviter lateque acuminatis acute subcoriaceis vel subchartaceis, supra glabris pallidis nitidisque venis impresso-prominulis, subtus

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[32] Part I of this series was issued in Bol. Soc. Venez. Ci. Nat. 14: 1–15 (1951).

Foot-notes and figures in this paper are numbered consecutively with those of "Anatomy of Guayana Mutisieae" (Mem. N. Y. Bot. Gard. 9:441–476).

[33] E. & P. Nat. Pfl. ed. 2, 15a: 433. 1930

[34] Blumea 2: 339–384. 1937.

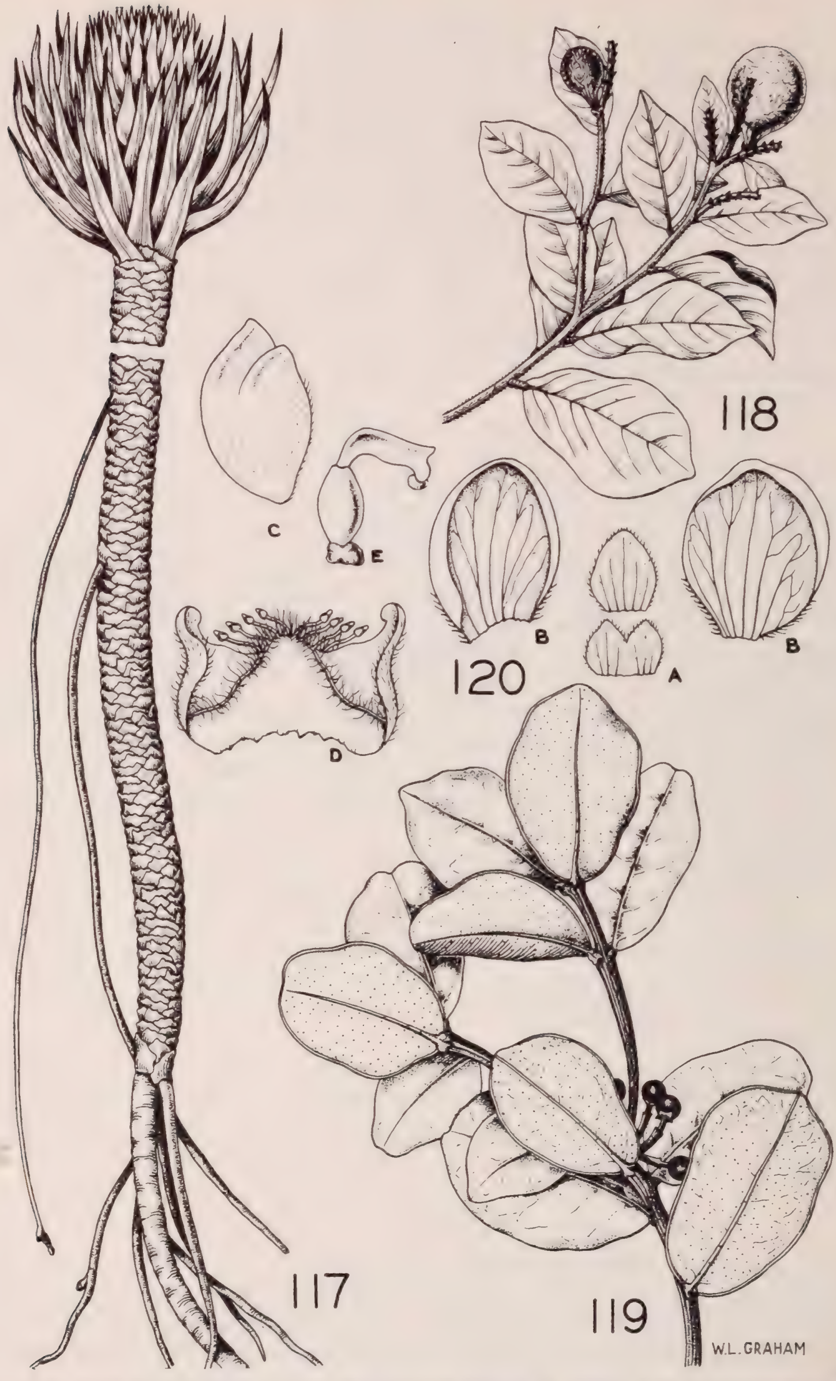

FIG. 117. *Barbacenia uaipanensis* Maguire. Habit, × ½. FIG. 118. *Licania hitchcockii* Maguire. Fruiting branch, × ½. FIG. 119. *Ilex brevipetiolata* Steyermark & Wurdack. Fruiting branch, × ½. FIG. 120. *Monnina uaipanensis* Wurdack. A, outer sepals, × 5; B, alae, × 5; C, keel, × 5; D, staminal tube and lateral petals, × 5; E, pistil, × 5.

pannoso-fulvo-tomentosis, nervis lateralibus 6-7-jugis prominentibus brunneis costisque exceptis; petiolo ca. 2 mm longo, crasse puberulo-eglanduloso aliquantum rugoso transverse rimosoque; stipulis ca. 2 mm longis, falcato-subulatis crassis puberulis caducis nodo adnatis; inflorescentiis spicatis fulvo-velutinosis 1-2 cm longis, bracteis minutis; floribus ca. 2.5 mm longis strigoso-velutinosis sessilibus; fructibus 2.5-3.0 cm longis 1.5-2.0 cm latis, obovatis vestitis granulo-compactis flavo-viridibus.

TYPE: small tree to 8 m high, with pale green fruit, one of two tallest on cumbre, immersed in dense shrub growth 1 m high, 1700 m alt., February 1-15, 1948, Uaipán-tepuí, Bolívar, Venezuela, *407* (NY).

Licania hitchcockii belongs without question to the *L. macrantha* Hook. f. complex, but has become sharply differentiated, most conspicuously by the small elliptic leaves and short spicate inflorescences.

POLYGALACEAE

Monnina uaipanensis Wurdack, sp. nov. (Fig. 120.)

Frutex; ramis juvenilibus sparse patenti-hirsutulis glabrescentibus; foliis coriaceis ovalibus vel subobovatis, 4-6 cm longis 2-3 cm latis, apice rotundato vel subacuto base cuneata vel rotundato-cuneata margine anguste revoluta, juvenilibus strigulosis glabrescentibus (per venulis exceptis); raceni pauci 2-3-aggregati bracteis inconspicuis (ad 1.4 mm longis) caducis; floribus 4.5-5.0 mm longis, pedicello 1.0-1.2 mm longo puberulo; sepalis exterioribus dorso puberulis duobus inferioribus 1.3-1.5 mm longis ovatis 1/3-1/2 connatis 1-3-nerviis, sepalo superiore 2.0-2.1 mm longo 1.5-1.6 mm lato 5-nervio, alis 4.5-4.8 mm longis 3.7-3.8 mm latis obovato-suborbicularibus 7-nerviis glabris marginibus subtus ciliolatis; carina 4.7-4.8 mm longa 3.0-3.2 mm lata extus sparse puberula; petalis lateralibus marginibus lateralibus ciliatis extus puberulis intus marginibus lateralibus puberulis marginibus apicalibus glabris; staminibus 8, filamentis glabris vaginae margine ciliata extus costa media puberula aliter glabra; ovario ca. 2.0 mm longo, glabro; stylo 2.8-3.0 mm longo, statim sed non subito geniculato glabro, base 0.5 mm apice 0.7 mm lato; stigmate apice superiore tuberculato apice inferiore acuto; drupis ovalibus, 6 mm longis 4 mm latis glabris reticulatis exalatis.

TYPE: bush, rare, small purple flowers, grows straight up in single stalk above nearby bushes, about 4 m high, cumbre 1900 m alt., Uaipán, Bolívar, Venezuela, February 1-15, 1948, *368* (NY). Paratype: Uaipán, 1600 m alt., *Cardona 2006.*

Related to *M. cacumina* N. E. Brown and *M. duidae* Blake, but distinguishable from the former by smaller flowers and oval leaves, from the latter by larger leaves, and from both by the style which is immediately but not abruptly geniculate above the ovary. In both related species, the basal part of the style is erect to semi-erect for a distance of 0.6-1.2 mm above the ovary.

AQUIFOLIACEAE

Ilex brevipetiolata Steyermark & Wurdack, sp. nov. (Fig. 119.)

Arbor ad 10 m alta; ramulis longitudine striato-subsulcatis sub lente pulverulo-pilosulis; foliis perbreviter petiolatis, petiolo 1-2 mm longo, crasso rugoso, laminis integris glabris crasse coriaceis ovalibus vel subobovatis, apice obtuso subrotundato vel perbreviter apiculato, base subobtusa vel rotundata, 4.0-6.0 cm longa 2.8-4.2 cm lata, subtus modice punctulatis; costa media supra tenuiter insculpta vel plana subtus expressa, nervis lateralibus utrinque 6-10 supra

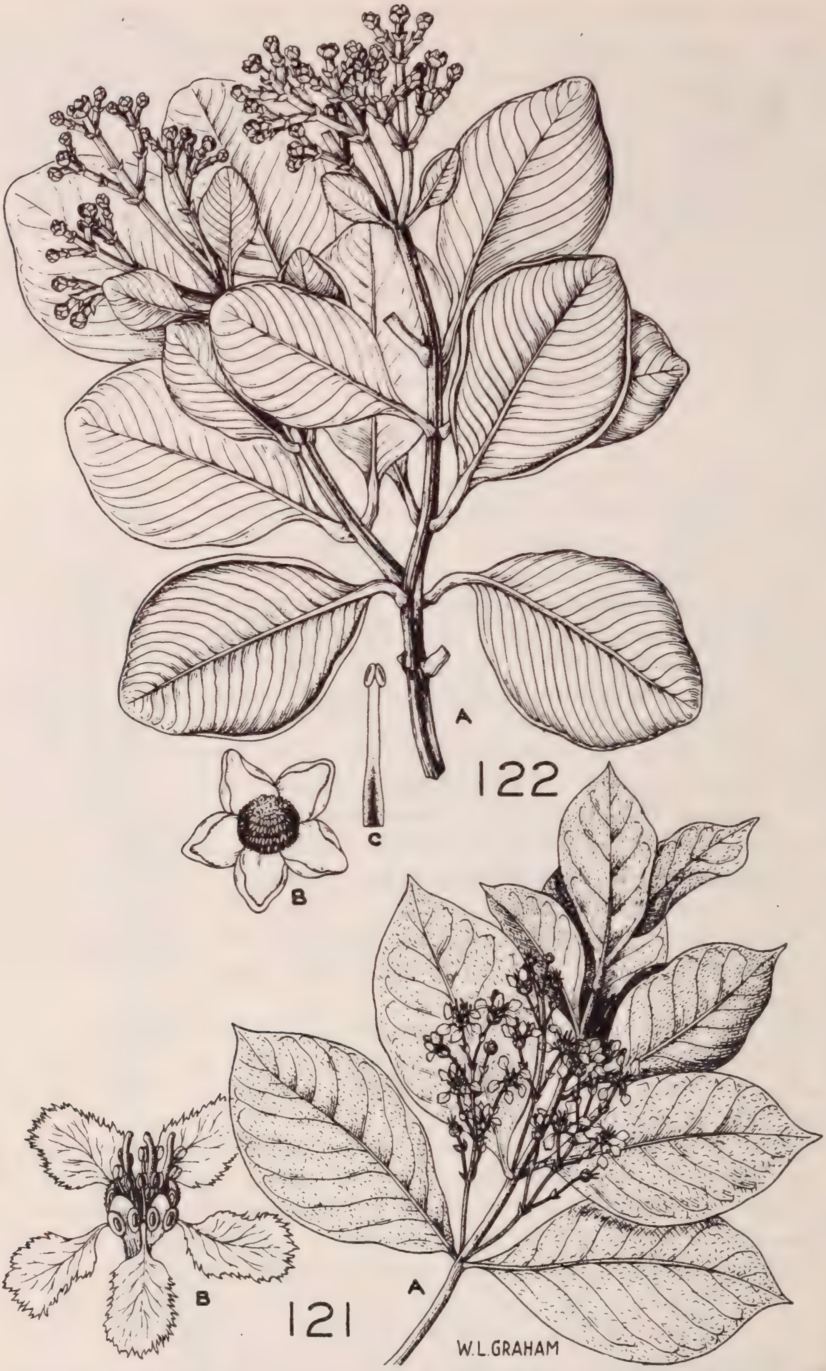

FIG. 121. *Tetrapteris phyllandenophora* Maguire & Steyermark. A, flowering branch, × ½; B, flower, × 2. FIG. 122. *Clusia cardonae* Maguire. A, flowering branch, × ½; B, staminate flower, × 2; C, stamen, × 10.

obsolete prominulis vel obsoletis subtus obsolete prominulis; inflorescentiis femineis ad ramulorum hornotinorum basin singulatim congestis vel in foliorum axillaribus solitariis 1-3-floris; floribus ignotis; pedunculis fructiferis pilosulis ad 7 mm longis, pedicellis 3-4 mm longis, cum calycibus pulverulo-pilosulis; drupa immatura globosa, 5.0-5.5 mm diam., stigmate prominulo vel vix prominulo coronato, in sicco minute rugoso 4-vel raro 5-pyrenifero.

TYPE: tree to 10 m, abundant in little forests, none in bloom, sabana, west slope of Uaipán-tepuí at 1400 m alt., Bolívar, Venezuela, January 27, 1948, *347* (NY). Paratypes; Cerro Uaipán, 1700 m, F. *Cardona 2062;* tree 30 feet tall; leaves coriaceous, deep green and shining above, pale green below, punctate below; fruit dull green, rich woods, vicinity of "Misia Kathy Camp" on mesa between Ptarí-tepuí and Sororopán-tepuí, Bolívar, alt. 1615 m, *Steyermark 60290.*

Related to *I. spruceana* Reiss. and *I. duidae* Gleason. From the former it may be distinguished by the very short petioles, longer peduncles, 1-3-flowered cymules, and non-sulcate globose fruits; from the latter by the slightly shorter petioles, puberulous branchlets, peduncles, and pedicels, and larger globose drupes not tapering apically.

MALPIGHIACEAE

Tetrapterys phylladenophora Maguire & Steyermark. Subg. *Mischolepis* Niedenzu, sect. *Macrophyllaries* Niedenzu. (Fig. 121.)

Frutex parvus; ramulis teretibus 2-3 mm diam. adpresso-fulvo-sericeis; foliis oppositis, laminis oblanceolatis, 6-8 cm longis (3) 3.4-4.5 cm latis, supra puberulis vel glabrescentibus subnitidis, subtus dense fulvo-sericeis glandulis sessilibus submarginalibus, 6-7 jugis venis lateralibus prominulis, apice breviacuminato vel cuspidato, base subacuta, petiolis 6-8 mm longis, eglandulosis, stipulis minutis, minus 0.3 mm longis; inflorescentiis sericeis axillaribus foliis brevioribus paucifloris, ramulis unifloris, bracteis lanceolatis acutis, ca. 2 mm longis, bracteolis ovatis vel subrotundatis, 2-3 mm longis; sepalis ovato-oblongis vel subrotundatis, 3-4 mm longis, subcarnosis prominenter biglandularibus. laminis extus sericeis, intus glabris; petalis flavis, 8-10 mm longis, unguibus ca. 2 mm longis, laminis suborbicularibus fimbriatis; staminibus 10, filamentis inaequilateralibus, sepalis oppositis longioribus angustioribusque, antheris 1.0-1.3 mm longis; pistillis 3, ovariis hirsutulis quadrialatis (immaturis), stylis glabris erectis, ca. 4 mm longis, apice dorso apiculato, stigmate discoideo.

TYPE: bush 2 m high with yellow axillary flowers, petals 5 fimbriate, leaves especially the young ones soft, silvery, rare, 1400 m alt., Uaipán-tepuí, Bolívar, Venezuela, February 10-15, 1948, *426* (NY). Paratypes: arbusto de flores amarillas, crece en las orillas de un arroyo Kavanayén, Guayana, Venezuela, May 28, 1947, *Lasser 1785*; shrub 10 feet tall, leaves subcoriaceous, dull green above, gray-green below, on large mesa, Kavanayén northwest to Río Karuai, alt. 1220 m, Bolívar, *Steyermark 59381;* liana on shrubs, fruit wings red, 8 km northwest of Kavanayén, *Styermark 60451.* The fruits of this specimen are described as follows: samara sericeo-hispidulous, body suborbicular 3-4 mm long, lateral wings subequal membranous red, 2 superior wings obliquely erect, obliquely linear-lanceolate the apex obtuse entire or subentire 13-14 mm long 2.5 mm wide, the 2 inferior wings obliquely linear-oblanceolate 14-16 mm long 3.0-3.5 mm wide, aluta dorsal semi-orbicular-annuliform subentire 2.5-3.0 mm wide scantily sericeo-pubescent below.

Our species seems to fit into sect. *Macrophyllaris* of subg. *Mischolepis,* but to be without immediate relatives in Venezuela, other than perhaps *T. oleifolia* (Benth.) Niedenzu from Mt. Roraima.

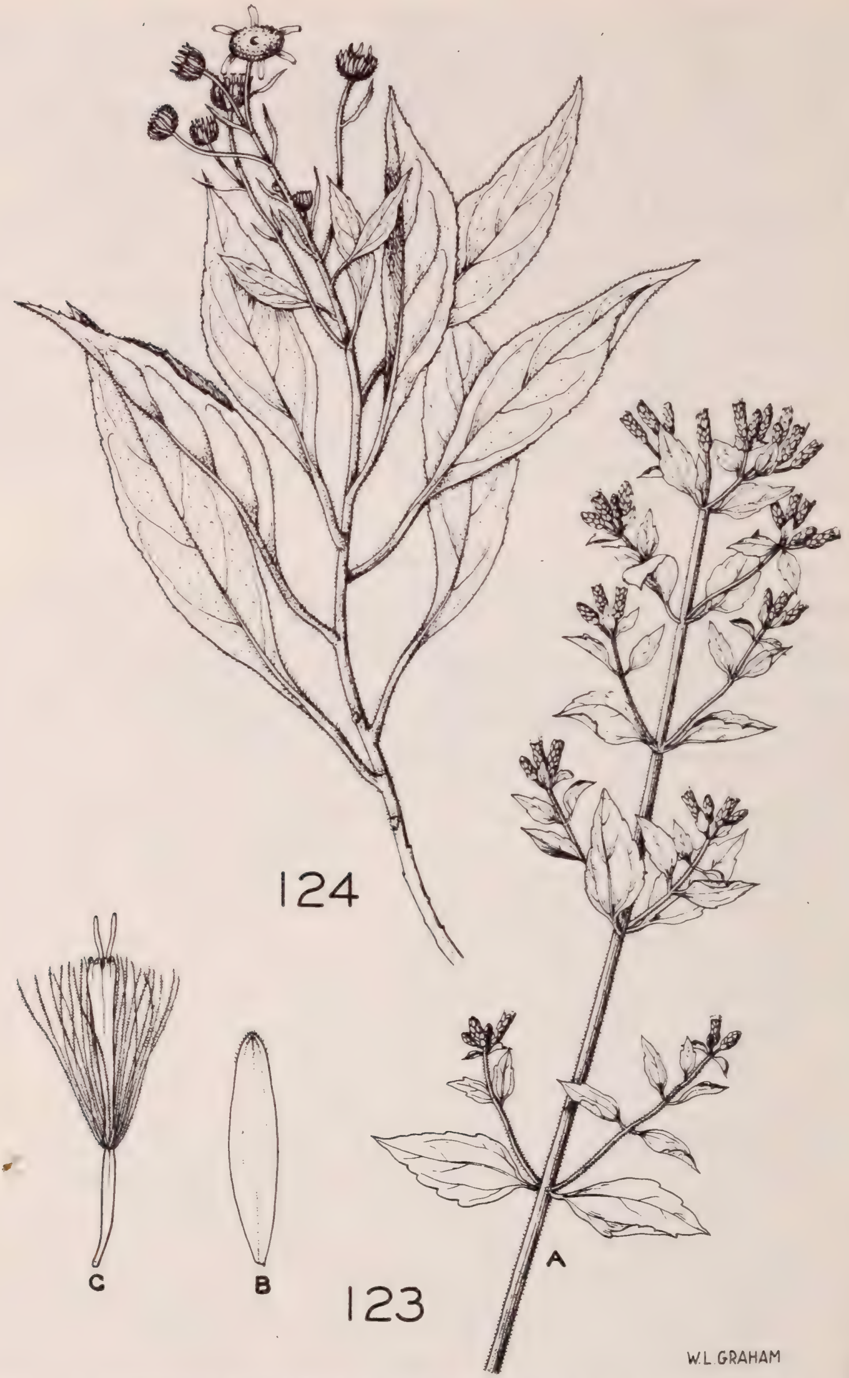

FIG. 123. *Eupatorium thurnii* Rob. A, flowering branch, × ½; B, phyllary, × 4; C, flower, × 4. FIG. 124. *Verbesina pilosa* Maguire & Wurdack. Flowering branch, × ½.

GUTTIFERAE

Clusia cardonae Maguire sp. nov. sect. *Criuva* Benth. & Hook., subsect. *Eucriuva* Engl. (Fig. 122.)

Arbor parva; ramulis in sicco quadrangulatis ca. 4-5 mm crassis, internodiis 1-3 cm longis; foliis coriaceis obovato-ellipticis vel rhomboideo-ellipticis, 5-8 cm longis 3.5-4.5 cm latis, apice acuto, base acutiuscula, marginibus valde revolutis, costa prominenta apice extenta, nervis 2-3 mm distantibus prominulis, petiolo 18-20 mm longo; inflorescentia terminali botryoidea subcompacte multiflora, 8 cm longa, ramulis carnosis in sicco acute angulosis; bracteis primariis foliaribus, 2-3 cm longis, bracteolis carnosis carinatis deltoideis acutis, 2-3 mm longis; floribus masculinis: sepalis 4 decussatis carnosis, ca. 2 mm longis, exterioribus late ovato-orbicularibus obtusiusculis, interioribus obovato-orbicularibus cucullatis; petalis (4) 5 obovato-orbicularibus, ca. 6 mm longis ca. 6 mm latis, concavis; staminibus 40-50, filamentis 1-2 mm longis 0.5 mm crassis, liberis, antheris 0.8-1.0 mm longis, loculis lateraliter dehiscentibus connectivo lato excedentibus; floribus femineis ignotis; fructibus ignotis.

TYPE: tree to 5 m high, leaves thick, flowers with waxy-white petals; most abundant and prominent tree on the 1700 m cumbre, always growing with other vegetation of similar height; all trees flowering at the same time, Uaipán-tepuí, Bolívar, Venezuela, February 1-15, 1948, *412* (NY). Paratype: Cerro Uaipán, 700 m, Río Caroní, Guayana, arbol 6 m alto, Noviembre 26, 1946, *F. Cardona 2064.*

Because of its 4 decussate sepals, 5 small petals, and numerous free stamens, this conspicuous tree of Uaipán-tepuí summits must be assigned to the *Eucriuva* of sect. *Criuva.* It apparently has no known immediate relatives in the Gran Sabana region.

COMPOSITAE

Verbesina pilosa Maguire & Wurdack, sp. nov. sect. *Saubinetia.* (Fig. 124.)

Frutex 2 m altus; caulibus piloso-tomentosis exalatis; foliis alternis, laminis lanceolatis, 12-14 cm longis 2.8-3.5 cm latis, serrulatis denticulis 5-11 mm distantibus chartaceis penninerviis, supra modice pilosis pilis base tuberculatis, subtus dense canescenti-pilosis, base attenuata, apice acuto, petiolis canescenti-pilosis, 1.0-1.5 cm longis; inflorescentia corymbosa, pedunculis dense pilosis; capitulis 10 mm altis 15 mm diam.; involucro 2-3-seriato, bracteis oblanceolatis pilosis, 7-11 mm longis; floribus ligulatis 5-6, 9.0-12.0 mm longis, laminis ovatis 9-11 mm longis, apice 3-denticulato, floribus tubulatis ca. 75-80, tubulo ca. 5.5 mm longo, apice sparse piloso, base per 1.5 mm contracto modice puberulo, lobis ca. 0.8 mm longis; achaeniis maturis anguste alatis sparse hispidulis, aristis 2 hispidulissimis 5.0-5.3 mm longis.

TYPE: cumbre of 1200 m, Uaipán-tepuí, Bolívar, Venezuela, February 1-15, 1948, *424* (NY).

Related to *V. sordescens* DC. from Brazil and Paraguay, but distinguished, by the distinctly petiolate leaves, somewhat larger involucral bracts, denser indumentum, and smaller number of ray flowers. The leaves closely resemble *Sydow 752* from Ecuador (*V. inuloides* Hier.) but the achene awns in that specimen are much shorter and the leaves are more noticeably tuberculate on the upper surface. Another close relative is *V. schomburgkii* Schultz-Bip. subsp. *eligulata* Maguire & Wurdack.

Calea lucidivenia var. lucidivenia. *C. lucidivenia* Gleason & Blake, Brittonia 3: 193, as to type. 1939.

The var. *lucidivenia* is entirely glabrous. The leaves and outer involucral bracts are devoid of punctate glands. Besides *Tate 1324* (type, NY) and *Tate*

1363 (NY) from Auyán-tepuí, the typical variety is now in addition known by the following.

Salto Eutocuamini, Rio Caroní, Guayana. *Cardona 1770* (US); Sta. Elena, Guayana, *Lasser 1287* (NY); Kavanayén, Guayana, *Lasser 1823* (NY); Sta. Elena, Guayana, *Tamayo 2706*; Kavanayén, *Steyermark, 59408* (type of *C. lucidivenia* f. *lanceolata* steyerm.), *60299; Maguire & Wurdack 34009;* Rio Aponguao, *Maguire 33636-*

C. lucidivenia var. punctata Maguire & Wurdack, var. nov.

Folia subtus et bracteae exteriores involucrorum prominenter punctato-glandularibus, alioque var. *lucidiveniae* similis.

TYPE: shrub with yellow flowers, very common on the slope and cumbre at 1900 m alt., Uaipán-tepuí, Bolívar, Venezuela, January 27, 1948, *336* (NY). Paratypes; Uaipán-tepuí, 1800 m alt., *Cardona 2032* (NY, US), Cerro Guaiquinima, Alto Río Paragua, Guayana, alt. 1800 m; *Cardona 957* (NY); *Maguire, 32776, 32819, 32853, 33000-A.*

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